TECHNOLOGY DEPT.

Gas Journal

VOL. 287. 108th YEAR. LONDON, SEPTEMBER 26, 1956. No. 4863. PRICE 1/6

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home of the Festival and the Alder & Mackay meter;
a meter that combines dramatic performance
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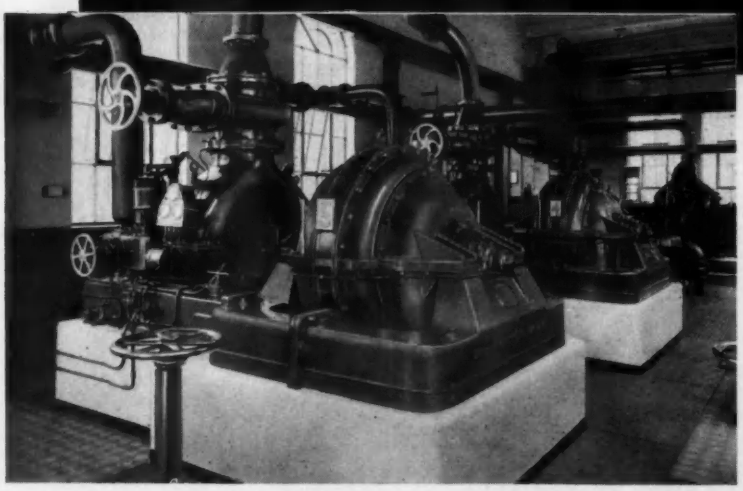

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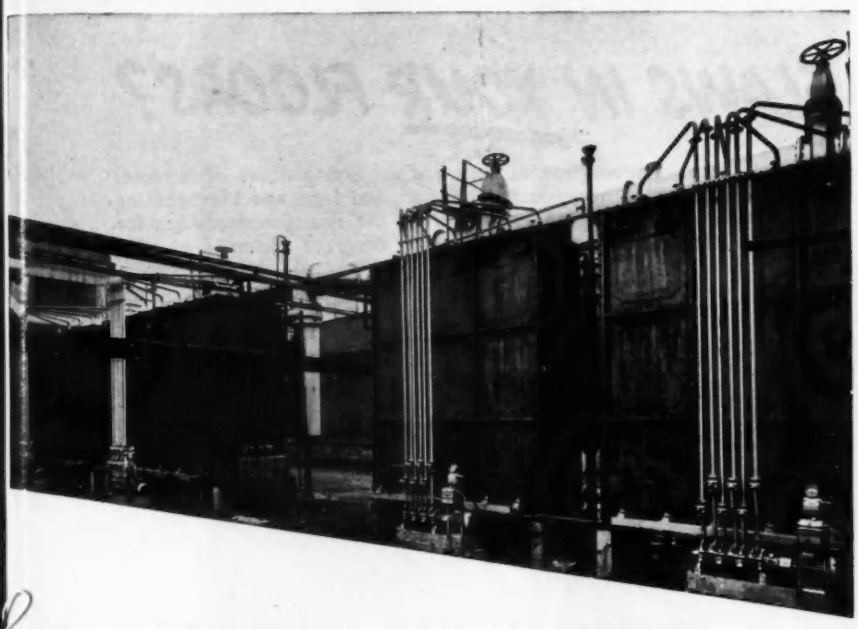

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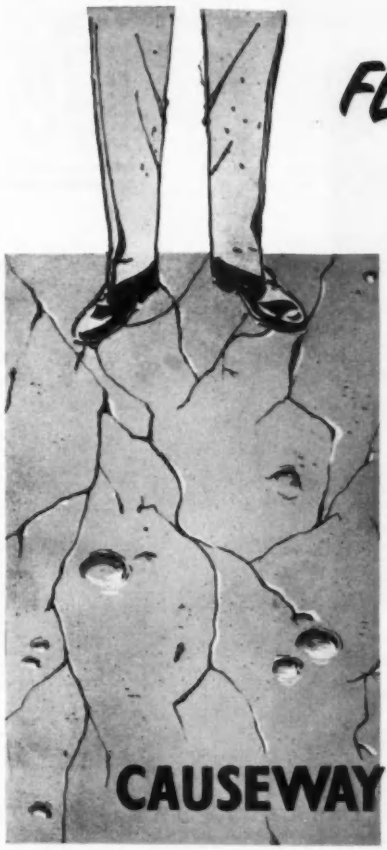

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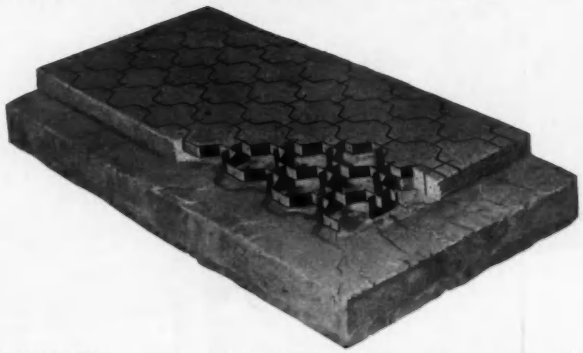
Intensified production outputs are subjecting floors of factories and works to heavy loads, vibration, and heat and are breaking them up, bringing an added burden for managements. See for yourself how Hexmetal strengthens concrete floors.



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by the improved

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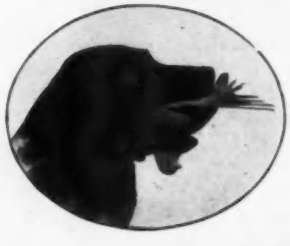

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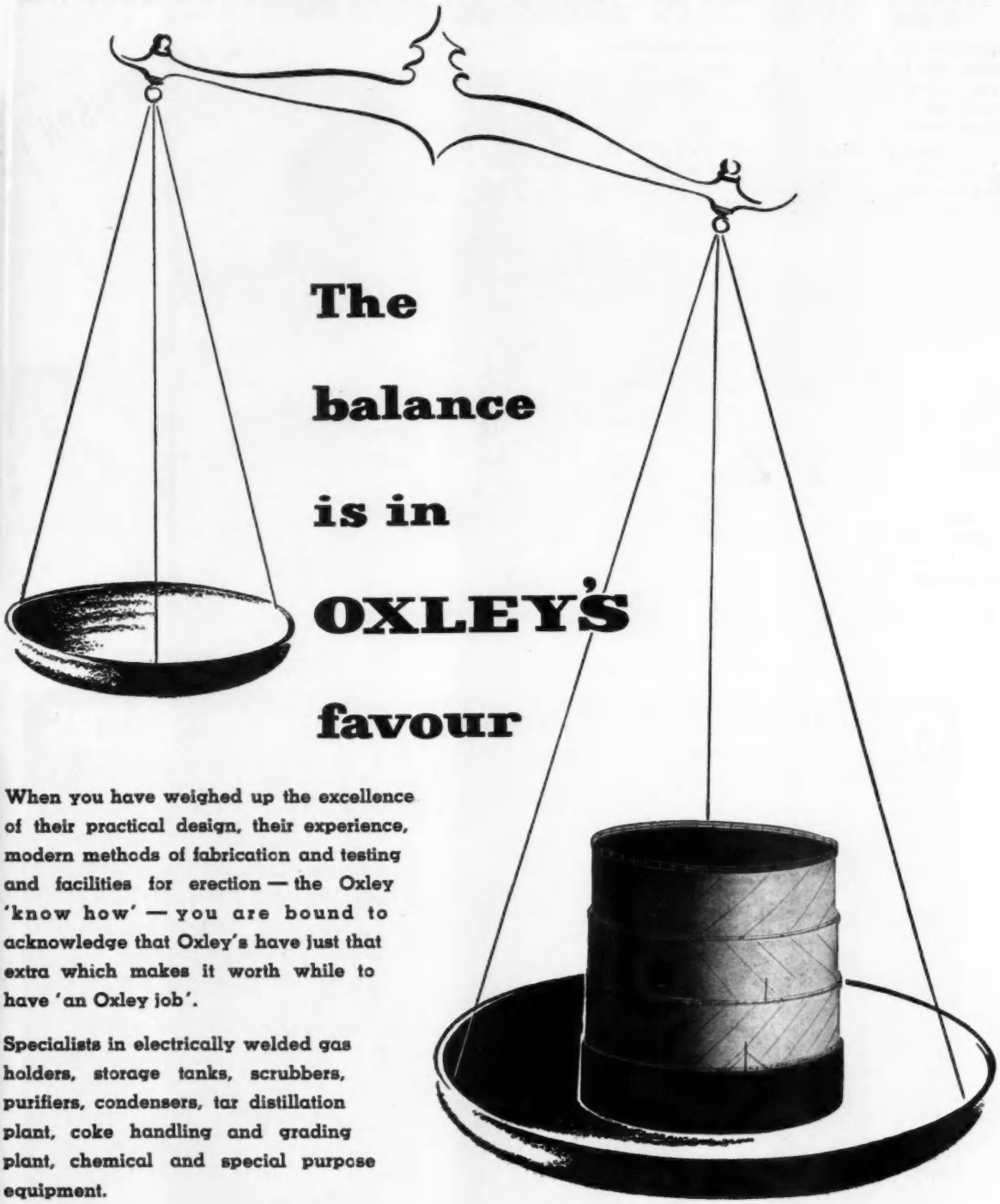

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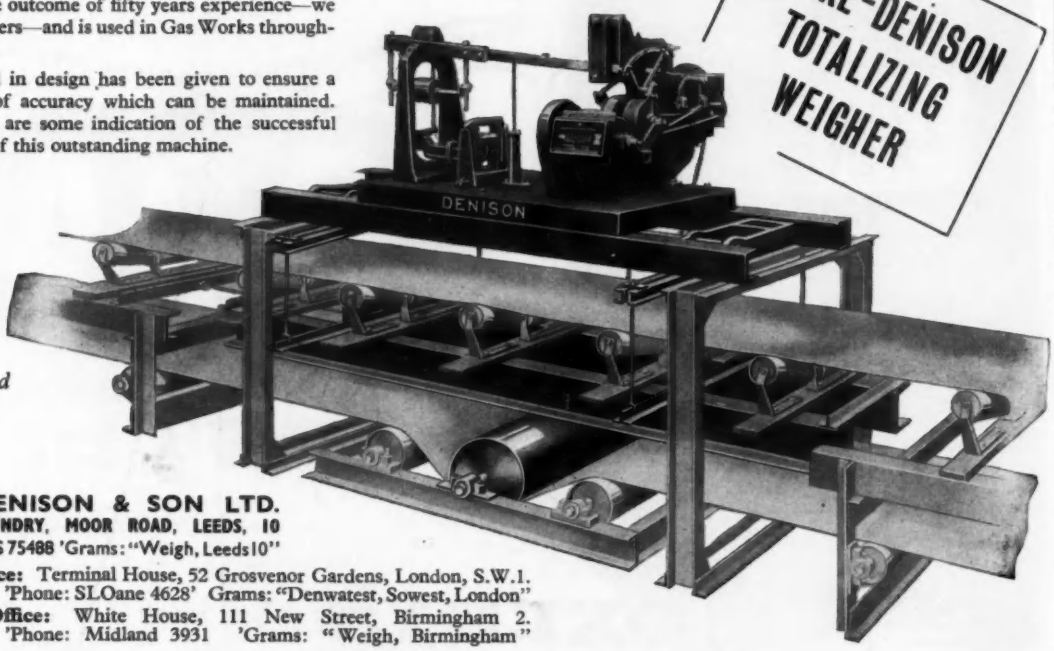

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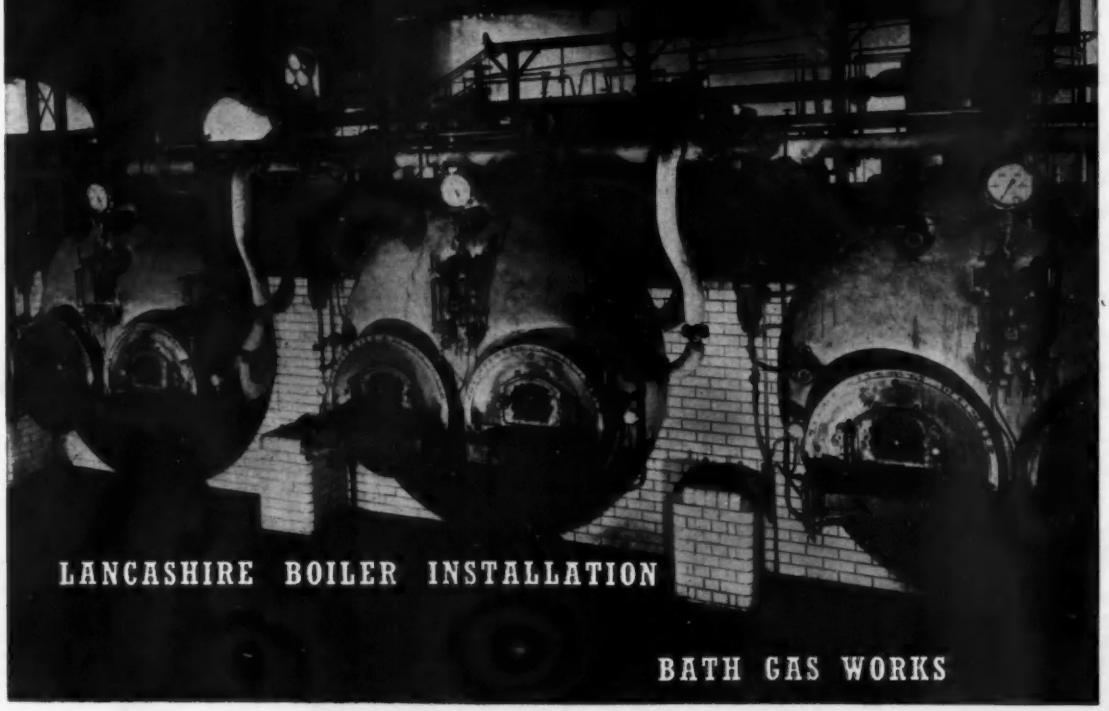

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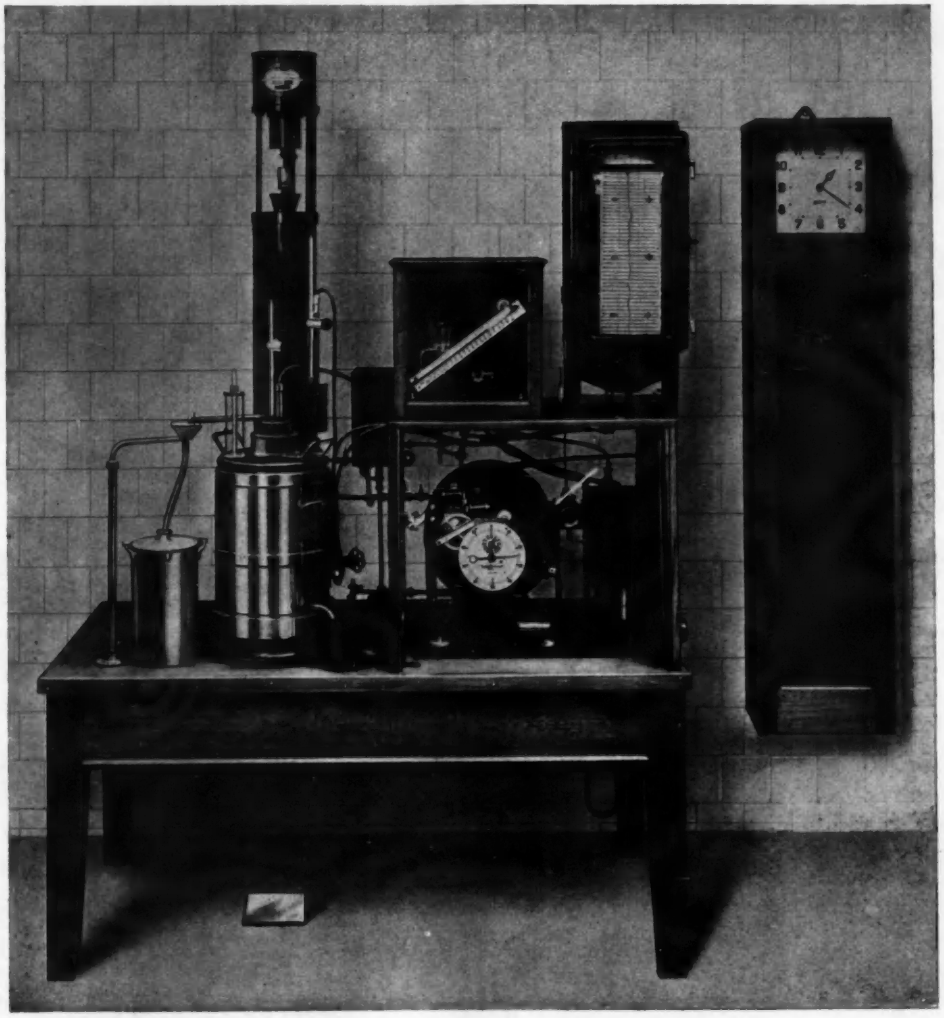

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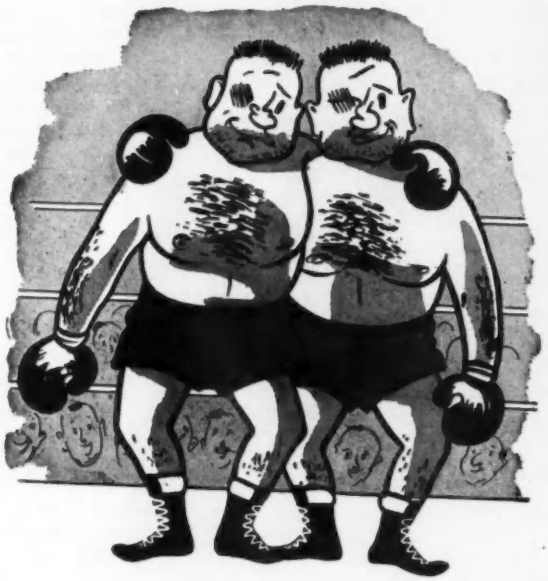

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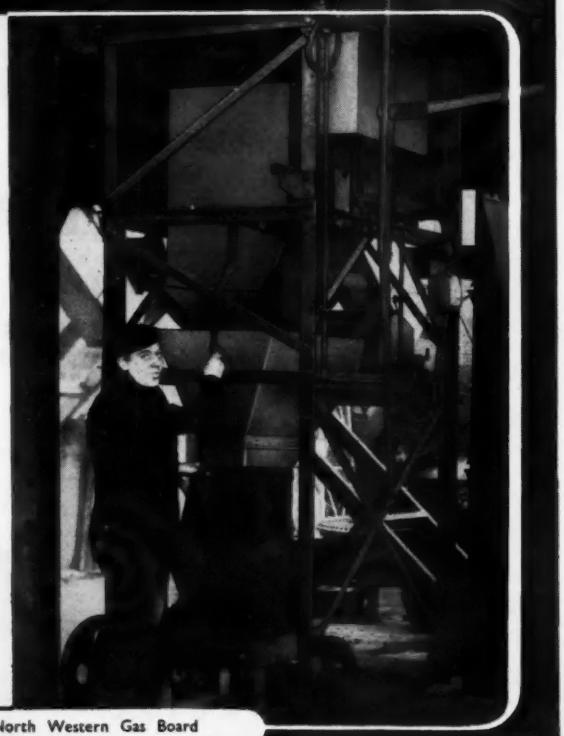

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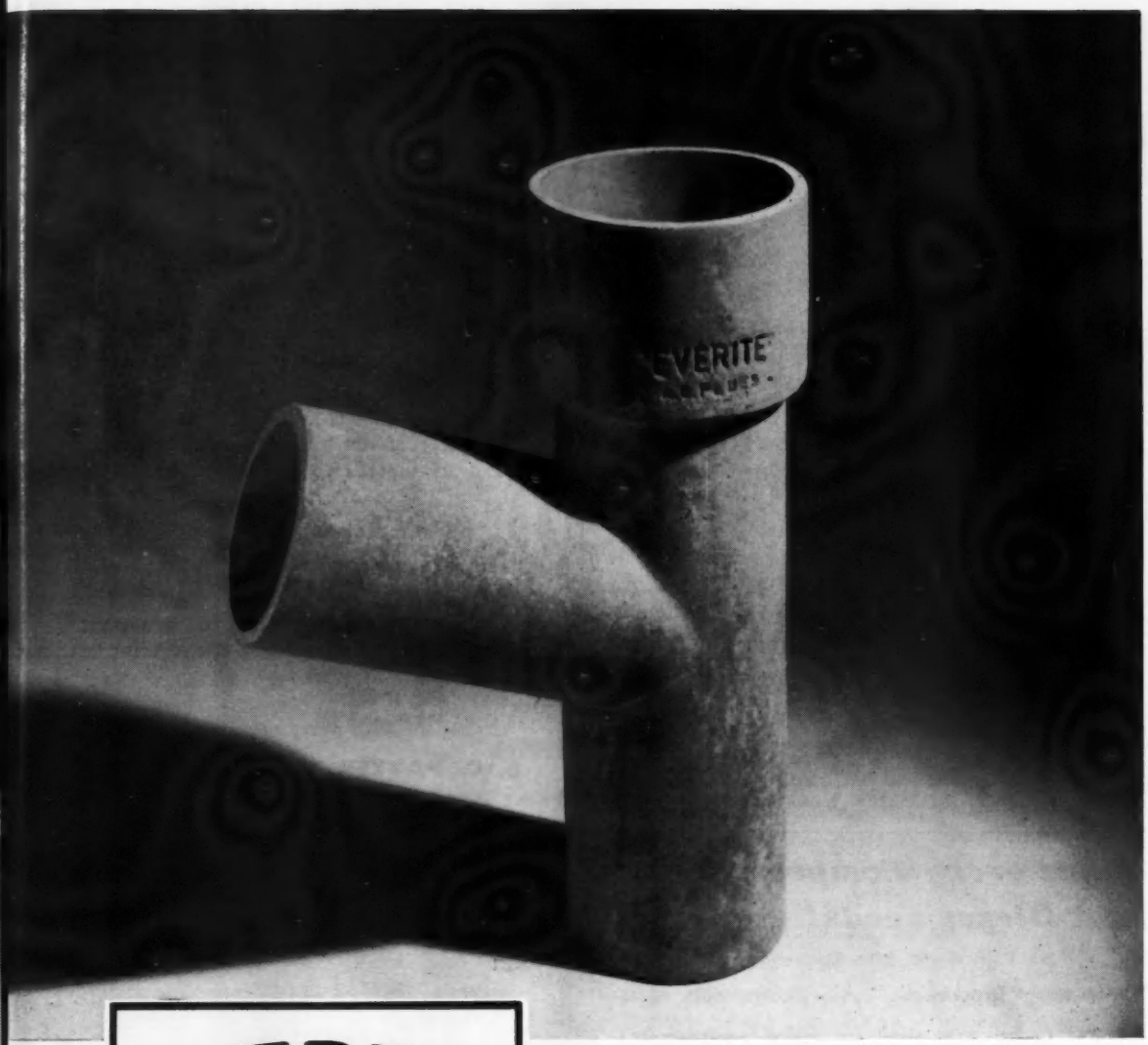

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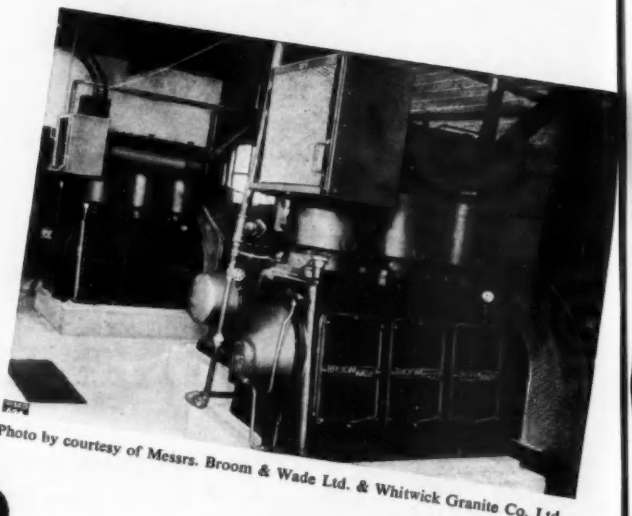

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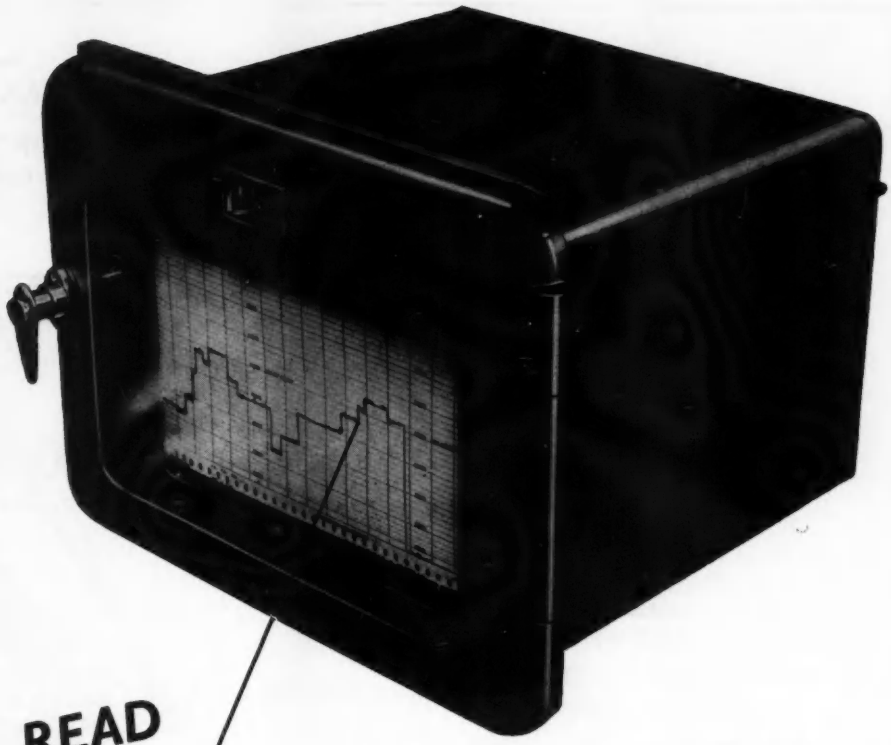

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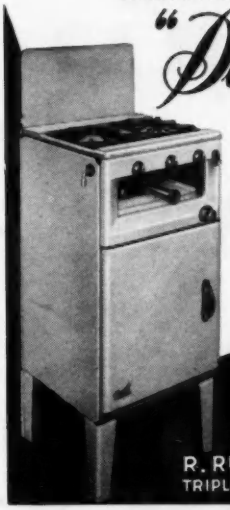
"Dainty Queen" REGISTERED



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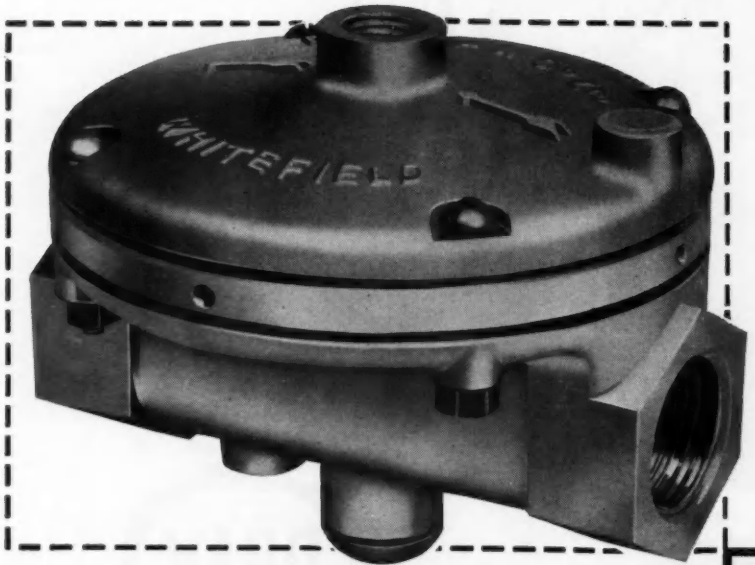

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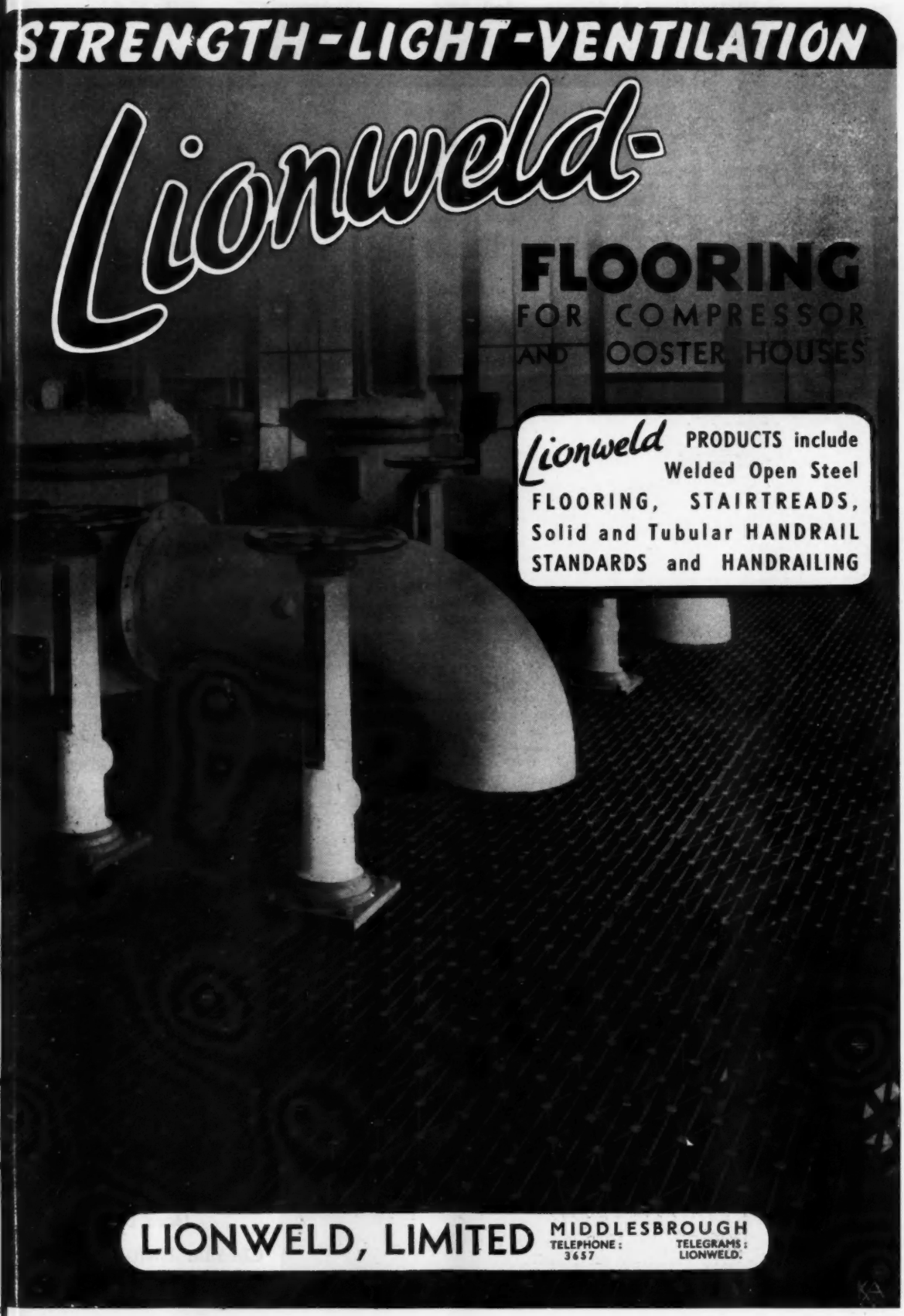
- ★ Adjustment for alternative pressures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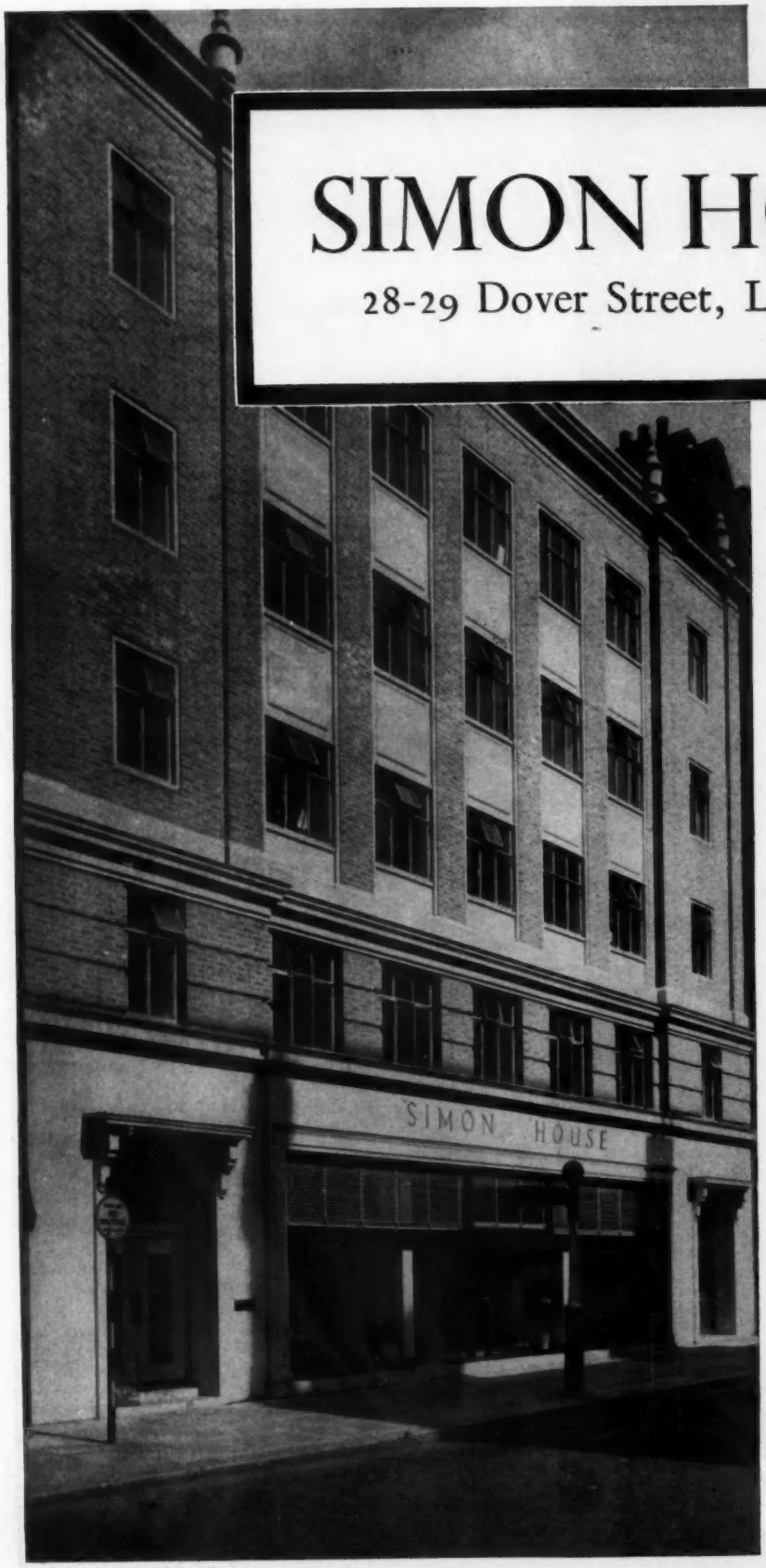

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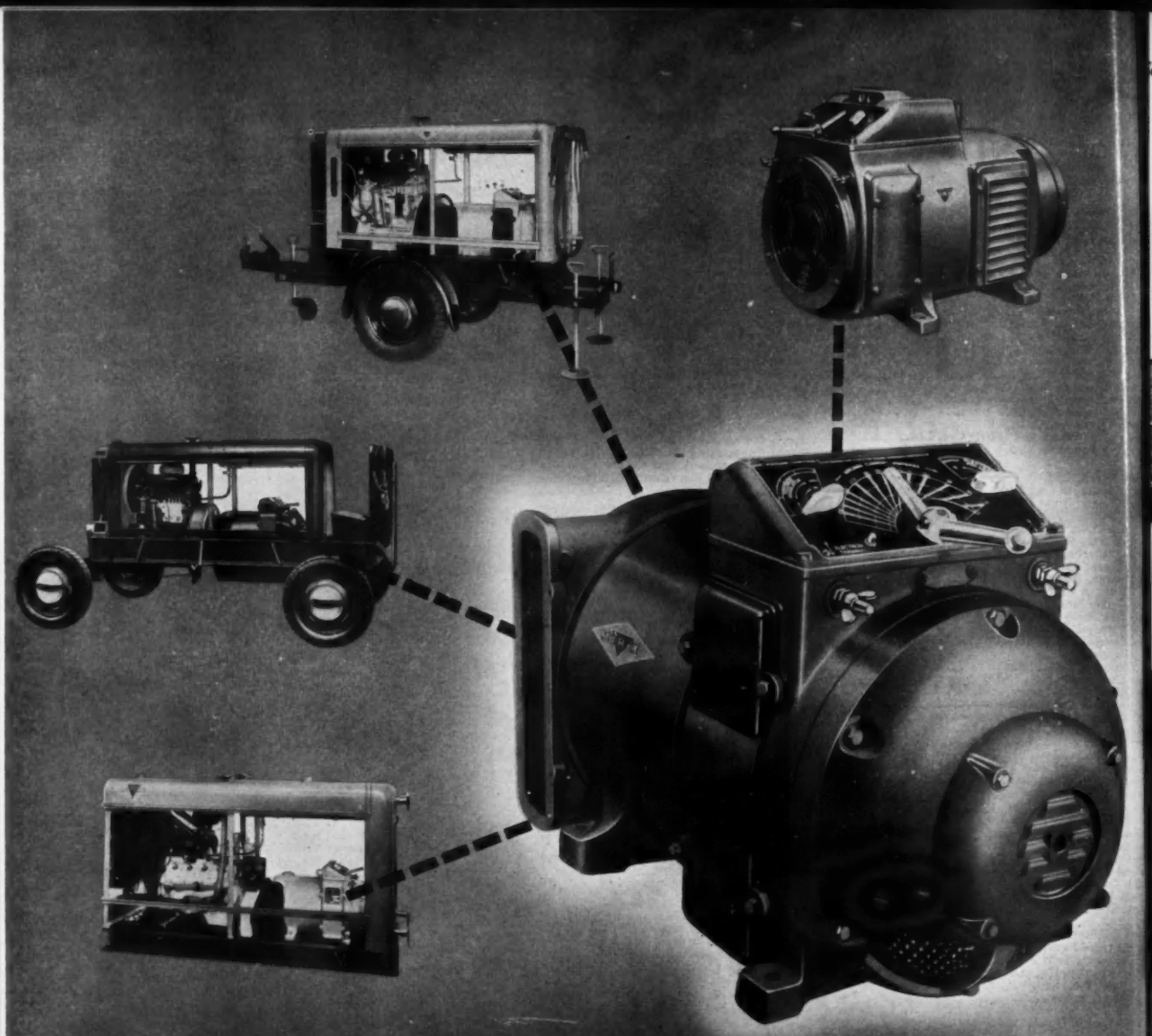

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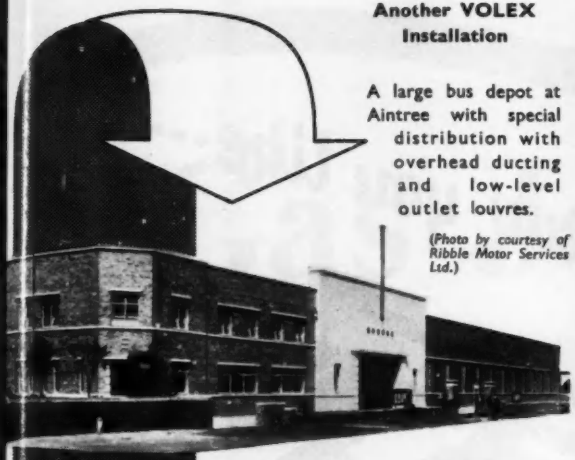

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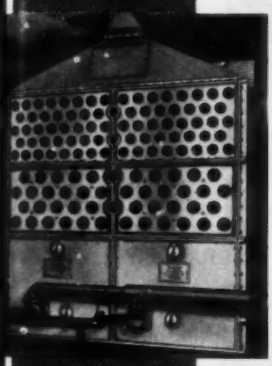

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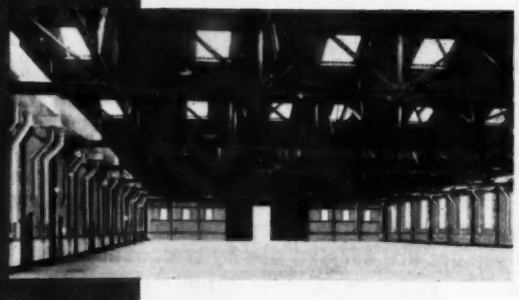

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Gas Journal

VOLUME 287. No. 4863. SEPTEMBER 26, 1956. 108th YEAR

Training and Education—a World Problem

ONE of the greatest problems facing Europe and America today is the education and training of youth. This immediate problem also faces Eastern Europe, and Russia in particular. In Western Europe and America the chief aim must be to have trained men and women to take their places in industry to keep their countries in the forefront of pure scientific research and the industrial application of the results of such research. Added to this, a country must have technologists, technicians, and perhaps as important as any of these, young men to qualify for the higher posts of management.

In fact, it could be truly said that never in the history of Western Europe or America have there been such opportunities for keen young men with a scientific bent. In Russia, too, there would appear to be tremendous opportunities for scientists and technicians of all types, and there the problem facing the country is not so much to keep ahead as to carry out as painlessly as possible an industrialising process to take the place of the predominately agricultural economy of the country at present. This process appears to have been speeded up since the war and Russia is making vast efforts to overcome her industrial shortcomings in a renewed attack on the west to make good the failures of the 'cold war.' She seems to be doing this by vastly increasing the exploitation of her natural resources, especially oil and natural gas, by the laying of pipelines, and by encouraging her population to become technically minded both by educating them to become engineers and technicians, and to grant them a better status by paying good salaries and giving certain priorities. Figures of the numbers of engineers being turned out by the Universities in Russia and America appear to us in England to be very large indeed, but there is also a tendency for us in this country to pass it off lightly by saying that it is a matter of quantity production with little thought for quality. In this respect Russia is a completely unknown quantity, but in America it seems that there too grave doubts are being expressed as to how the flow of engineers and scientists from the universities is going to be maintained, let alone increased.

Both in the United Kingdom and in America similar problems are apparent, but in America they seem if anything to be even more acute. The numbers going to universities and technical colleges on the other side of the Atlantic are steadily falling because of the low birth rate of the 1930's and it is estimated that not until 1960 will the numbers have become equal to those at such colleges in 1945. Of the numbers passing out of the high schools with the talent for science, about 100,000 failed to proceed to the university for financial reasons, and a further 100,000 for lack of interest. It has been calculated that of the most intelligent 20% in the group of college age, less than half entered college and only a third graduated, and that less than 20% of those mentally equipped to get higher degrees actually obtained their Ph.D.

This appeared to be due to the very great shortage of science and mathematics teachers; one quarter of American high schools teach no chemistry or physics, and one quarter teach no geometry.

In this country too we hear a great deal about the shortages of all kinds of scientist, engineer and technician. The universities appear to be well attended and those with brains and ability worth developing are helped financially by scholarships. There is even then a shortage and the student who has just graduated in some scientific subject is certain of a job. In fact it appears that undergraduates a year or so before graduation may be sought after by likely employers, who will offer them posts after graduation. If they take their degree the post will have more opportunities and take the youth further than if he fails. But the offer holds good if he fails or passes. Needless to say only the best offers with the best firms at the highest remunerations are considered. These jobs will be for the scientists, engineers, and those interested in training for higher management.

What of the technician, the junior draughtsman, or the foreman types? Those who from their background

or mental equipment would show more ability at manual dexterity or at best would succeed in managing parties of men but need a technical training to help them do so? The shortages of these classes of youth are a legacy from the very black days of the depression of the 1930's. During the early 1930's, especially in the depressed areas where heavy industry predominated, the idea of becoming apprenticed to a trade was impossible. There were so many men looking for so few jobs that it must have seemed both unnecessary and hopelessly expensive for the employers to consider training the youth which was leaving school. There were certain jobs that boys could do and did, and when they grew too old for that job, there was nothing for them to graduate to and they became unemployed. So the highly paid job of machine minding or pulling the right handle at the precise moment was what everyone went for and held on to through thick or thin.

These days are over and everyone realises that to make the most of our youth we must look upon them as part of our indigenous natural wealth. Those with the ability to profit by both our older and 'red brick' universities must do so, but they must be conscious of their responsibilities. Those with science degrees will be in great demand and have the world at their feet; those with the arts degree will not be so fortunate, but in either case it is in each man's hands to make or mar his career. With the young man entering industry from school, it will be industry's job to train him in the manual skill he may need and encourage him to attend high schools or, if he shows particular promise, arrange for him to attend full-time courses at the technical colleges. Thus he will be able to learn the scientific background to his trade and perhaps in due course pass the various specialist and professional examinations to become fully qualified. The gas industry realises this. The Institution, the ultimate arbiter of professional conduct, decides on the standards, and the gas boards individually, by the appointment of educational officers, see to it, with the best of the material available, that the standards are reached.

A large section of the engineering industry of this country have had their own training departments for a number of years, so that though we may think our numbers lag behind those of other countries, we may see to it, through the provision of facilities for training, that our smaller population provides the highest quality of operative from chief executive to the fitter at the bench.

Coke in Perspective

IF coke has a personality—and our publicists seem determined to show us that it has—then it must feel highly gratified at the attention which it has received during the past year or so. From the shadowy land of mere by-products it has emerged into the national spotlight and, in our own rather more parochial circle, as the centre of excited comment. It was of course the Clean Air Bill (now an Act) which triggered off this interest, but within the gas industry credit must go to the Symposium on Coke which sent the echoes flying back in November, and has caused reverberations to thunder round the hills ever since. It has been discussed at Newcastle, Birmingham and Bristol, and last week it was the turn of the Scottish Association of Gas Managers at Largs. There, Sir Henry Jones, Dr. J. Burns, and Dr. F. J. Eaton turned up to set the ball rolling, rather like those talented panels who patrol the country as stimulators of interest on behalf of the B.B.C. Their comments and the discussion which followed are reported elsewhere in this issue.

For the moment, however, let us consider coke less from the close-up viewpoint inside the industry, and rather as it appears in the broad national structure of fuel availability. Soon the Minister will name the day for the Clean Air Act to come into force, and while the prohibition of the emission anywhere in the U.K. of 'dark' smoke is unlikely to affect the householder, a smoke control area in which it will become an offence to emit any smoke at all will bring the problem right into the householder's own hearth. It will be necessary for him to burn smokeless fuel, and if that fuel is to be solid he will need an assured supply. It is this last point which has caused misgivings in many quarters—despite the fact that there appears to be no evidence of a shortage in those smokeless zones which have already been introduced under special Acts.

Let us consider the supplies of solid smokeless fuels as they are at the moment. The gas coke position appears healthy and should there be the demand it is estimated that another 1 mill. tons could be supplied next year. However, it seems reasonable to suppose that the recent substantial price increases will do much to curb the natural upward swing of demand. Supplies of hard coke are less discernible, since although the National Coal Board's new plant at Chesterfield, designed primarily to supply the domestic market, has a capacity of ½ mill. tons, it will to some extent replace other obsolete plant; here again price presents something of a barrier. As for low temperature coke ('Coalite' and 'Rexco') we note that Coalite and Chemical Products are trebling the size of their Bolsover plant, thus permitting production of ½ mill. tons of 'Coalite' a year from 1957. And that is not the limit of possible expansion. Production of 'Rexco' has been vastly increased as a result of new plant, and next year output should be not less than 100,000 tons, compared with 30,000 tons last year. New plant has also benefited the production of 'Phurnacite,' the N.C.B.'s smokeless ovoids, and last year's output of 300,000 tons should be doubled next year.

Totting up it would appear that over 8 mill. tons of smokeless fuels should be available for the domestic market next year—a heartening thought for the Minister. And although this is far below the figure of 13 mill. tons which, it has been estimated, would be required to replace, ton for ton, domestic coal burned in those areas where smoke is a serious problem, no allowance has been made for the greater efficiency achieved by burning solid smokeless fuels in approved appliances. In other words, the enjoyment by Britain of Clean Air is less of a dream than some imagine, and the country's future dependence on gas coke may be coloured by personal taste and price rather more than optimists in the gas industry think. We have our opportunity—and it is a magnificent one—but long-term success is by no means guaranteed.

Sales Offensive

ANOTHER interesting aspect of the Scottish meeting was the fact that it provided a useful platform for Mr. Sydney Smith, the new Chairman of the Scottish Gas Board, to outline some of his plans for sales development in the area. His remarks were, we thought, both interesting and stimulating, and since there are signs that Mr. Smith intends to build up a sales and publicity team akin to that which he controlled so successfully in the East Midlands, we shall be surprised and disappointed if the Scottish gas industry does not make news in the months to come.

The magnitude of Mr. Smith's task was neatly explained when he pointed out that the Scottish Gas Board's area covered more ground than the Northern, North Western, North Eastern, East Midlands, West Midlands, North Thames, and South Eastern areas all put together, with 900 square miles left over—in all 30,400 square miles.

He was, he said, concerned about the competition they were experiencing in the north, and in the stern fight ahead they would join issue in no uncertain fashion. District sales and service representation (including home service advisers) would be increased where necessary; and with the help of the Press and Public Relations Officer and Advertising and Publicity Officer already engaged, the Board proposed to embark on extensive publicity of all kinds and implement sales campaigns in all divisions and groups. The increased expenditure did not worry him; he regarded it as a sound policy of investment.

Consumers, said Mr. Smith, are not in the least interested in the Board's problems, but only in their own. As far as gas was concerned that meant prompt, pleasant and efficient attention to their wants. 'If they don't get it, however, the electricity boys are round the corner and the ironmonger down the street sells both paraffin oil and the appliances in which to burn it.' It is as simple as that.

Another remark which registered was Mr. Smith's assertion that there is an attitude of mind abroad that if there is a gas cooker and wash boiler in a house, all is well. 'This is no more than a bread-and-butter load,' he said, 'and if we are to halt the present trend we must go flat out to sell and install additional appliances.' He regarded hire-purchase restrictions as a challenge, and since there was more money about today than ever before, if the Gas Board did not get its fair share of it, other sales organisations would. If the Board failed to meet the challenge 'the consequences will be dire indeed.' Finally, Mr. Smith said: 'I'll give you a promise, gentlemen, the Board will support you through thick and thin, but remember that the results are in *your* hands.'

Those are the sort of fighting words we like to hear from an area board chairman and we hope they fell on fertile soil. This is indeed a time for 'snapping out of it'; there will not be a second chance.

Personal Notes

MR. R. J. FAULKNER has been appointed Education and Training Officer to the Scottish Gas Board. Mr. Faulkner entered the gas industry in 1951 and for the past five years has been Education Officer to the North Eastern Gas Board. He previously served with the West Riding County Council as administrative assistant in the Education Department and later as youth employment officer. During the war he served as a pilot in the Royal Air Force and was demobilised with the rank of Flight Lieutenant. Mr. Faulkner has for some time been a member of the Institution of Gas Engineers Gas Education Committee.

MR. A. L. CATHERALL has been appointed Purchasing Officer to the Scottish Gas Board. Mr. Catherall entered the gas industry in 1926 when he began his training in the Chief Storekeeper and Buyer's Offices of the South Suburban Gas Company. In 1936 he was promoted assistant buyer and in 1938 Chief Assistant to the Buyer of the South Suburban Gas Company. During the war he served with the Lincolnshire Regiment. After demobilisation he returned to his old Company and on vesting date became under-buyer with the South Eastern Gas Board. In 1953 he was promoted to Senior Under-Buyer for the South Eastern Gas Board.

MR. R. DUNNETT is now Press and Public Relations Officer, Scottish Gas Board. Before becoming a free-lance writer and commentator in 1950, Mr. Dunnett was for five years Publicity Officer to the British Broadcasting Corporation in Scotland. In recent years Mr. Dunnett has become known through his many radio programmes and written articles for national newspapers and magazines. Finally in this list of Scottish Gas Board headquarters appointments, MR. J. R. A. CLARK has been made Advertising and Publicity Officer. After graduating in 1953, Mr. Clark spent two years on post-graduate research before being appointed publicity assistant in the Commercial Manager's Department of the East Midlands Gas Board.

MR. JAMES D. CAMPBELL has been appointed District Manager at Grangemouth, Scotland. Mr. Campbell began his career in the gas industry as an apprentice engineer in 1941 with the Dunfermline Corporation Gas Department. After serving his apprenticeship he was Technical Assistant at Dunfermline Gas Department from 1945 to 1952. Since 1952 he has been Assistant Manager at Grangemouth.

MR. J. N. WILSON and MR. R. S. FORD have been appointed to the Board of C. R. Averill, Ltd., of Caergwrle, Wrexham, North Wales, following a financial reconstruction of the Company. MR. C. R. AVERILL remains on the Board and in control of the Company's activities. 'Pursuant upon these arrangements,' says a statement, 'the past activities of the Company will be consolidated and extended.'

MR. J. R. ALLAN has been appointed General Manager of the Acme group of companies, in which are incorporated Acme Conveyors, Ltd., Acme Ventilating, Ltd., and Acme Welding & Constructional Engineering Co., Ltd.

MR. R. E. STEVENSON, who has been area sales representative of the Stanton Ironworks Co., Ltd., for several years, has been appointed to the position of Cardiff Manager.

Obituary

MR. H. E. IBBS, who was Chief Accountant of the former Gas Light and Coke Company for 21 years before his retirement in 1935, died in hospital at Tunbridge Wells on September 14 in his 84th year. His service, totalling 45 years, was all spent in the Gas Light Accountant's Department where he started as a junior clerk. In his younger days, Mr. Ibbs was a great all-round sportsman, playing tennis, golf and bowls. He was also an outstandingly good gymnast and a crack shot. He was former Editor of Field's Analysis.

Aberdeen Gasworks Will Have That £1 mill. Look, Soon

CAPACITY NEARLY DOUBLED IN ELEVEN YEARS

THE capacity of the Aberdeen gasworks will be practically doubled compared with 1945 when a £1 mill. modernisation and development programme, now in its final stages, is completed.

Since 1945 the number of consumers in the city has risen from 56,077 to 58,889 and the demand for gas has increased by some 50%.

Projects so far completed in the development programme include a new purification plant and an extension to the carbonising plant.

Work on the final parts of the plan is well advanced. A gasholder has been erected at Tullos—the first to be built in Aberdeen since 1894—and it is hoped to have it working for the winter.

At the gasworks itself has arisen a new, 108-ft. high carbonising plant, which is expected to be in operation in six months' time. Alongside it is growing a building which will be even taller—a coke storage and grading plant, which will be 122 ft. high when it is completed next summer.

Coke-grading

The coke-grading plant will be one of the most modern in Scotland and will help the Scottish Gas Board to meet the increased demand for high quality graded gas coke which is expected to result from the 'clean air' legislation.

One of the biggest problems in erecting these new buildings at the Cotton Street works has been the shortage of space. With the gasworks site hemmed in and already largely built upon, the work has had to be carried out in carefully-planned stages.

Council Began It

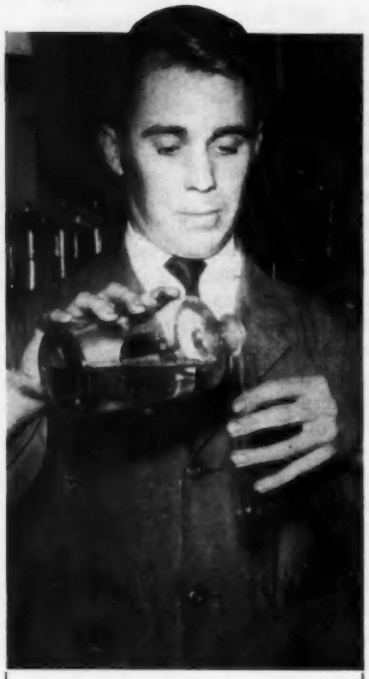
The development programme was initiated by Aberdeen Town Council in 1944 and continued by the Gas Board when they took over the undertaking in 1949.

The Town Council's planning has been well justified. For, between 1945 and 1955, gas output in the city has jumped from 2,192 mill. cu.ft. a year to 2,836 mill., and coal consumption has risen from 143,031 tons to 148,879 tons.

There has been an even bigger increase in the maximum demand for gas, which has gone up from 8 mill. cu.ft. in 1945 to 12 mill. cu.ft. last year. When the new plant is completed the works capacity will be in the region of 16 mill. cu.ft. in 24 hours.

One of the principal reasons why demand for gas has not outstripped capacity has been the introduction of the most modern and economical cooking and heating appliances. Since 1950 the number of up-to-date cookers in Aberdeen has risen from 11,400 to 30,400.

This means that fully three-quarters of the 38,000 gas cookers in the city are capable of doing as much for three therms of gas as the older type could do for five therms.



Milne-Watson Scholarship

A products works, Beckton employee of the North Thames Gas Board has been awarded the Milne-Watson Scholarship for 1956. He is 20-year-old Mr. Rodney Wakefield who has been working as a chemical assistant in the analytical laboratory on the works for the past two years.

The Scholarship was founded in 1946 in memory of the late Sir David Milne-Watson (a former Governor of the Gas Light and Coke Company) who was keenly interested in the welfare and further education of his employees. It is awarded annually by the Board to their 'most promising employee of the year,' and is tenable at a University College, or Technical Institute (to the holder's choice) for a degree or technical course. Leave of absence with pay is given and a grant made to cover fees and out-of-pocket expenses.

Rodney has chosen to study for the degree of B.Sc. in Special Chemistry, and starts on a course for this at the end of this month at the Northern Polytechnic.

'FREEDOM' ROW BREWING UP OVER ESTATE

THE Manchester and North Wales Electricity Board complain that as a result of Colywn Bay Council's policy tenants have no freedom of choice between gas and electricity for cooking on the Elwy-road housing estate at Rhos-on-Sea.

The Board points out that there has been considerable expenditure on the estate providing sub-stations and an underground distribution system.

But the Council's policy has been to install gas cookers and wash boilers throughout the estate.

The Board says that a formula has been worked out between the Local Authorities Association and the Central Electricity Board covering the question of the electrical facilities which are provided in council houses, and the effect that the extent of such facilities may have on the contributions which Electricity Boards may have to ask from local authorities towards the cost of sub-stations and mains required to feed housing estates.

The Council has decided to invite the Manchester and North Wales Electricity Board to send a representative to discuss the matter with the Chairman of the Housing Estates Committee, the Town Clerk, and the Borough Treasurer.

Diary

September 27. — WALES AND MON. JUNIORS: Treforest Trading Estate Restaurant, Treforest. 2.30 p.m.

September 28.—WALES G.C.C.: Council Chamber, Civic Centre, Tenby, 11 a.m.

September 29. — WALES AND MON. JUNIORS (NORTH WALES): Metropole Restaurant, Colwyn Bay. 3 p.m.

October 1.—SOCIETY OF ENGINEERS: Apartments of the Geological Society, Burlington House, W. 5 p.m. for 5.30 p.m.

October 2.—SOUTH EASTERN G.C.C.: 11 a.m.

October 3.—EASTERN SECTION, I.G.E.: Visit to Smith Clayton Forge, Lincoln.

October 3-5.—NATIONAL SMOKE ABATEMENT SOCIETY: Cambridge Hall, Lord Street. 10 a.m.

October 3-10.—FUEL EFFICIENCY EXHIBITION: 'Efficient Use of Fuel in Industry,' Conference, Olympia.

October 4.—WALES AND MONMOUTHSHIRE SECTION, I.G.E.: 10.30 a.m.

October 4.—INSTITUTE OF FUEL: Gas Showrooms Lecture Theatre, Nottingham. 6.15 p.m.

October 4.—WALES AND MON. SECTION, I.G.E.: Visit to Stewarts & Lloyds, Ltd., Newport.

SCOTTISH ASSOCIATION AT LARGS

Accent on Coke at Autumn Meeting

THE part to be played in the gas industry's future by coke formed the foundation on which was fashioned the programme of the Scottish Association of Gas Managers, which held its autumn meeting this year at Largs on September 19-21. With a symposium on coke and a paper concerned with coke the 'business' was devoted wholly to this subject—one which has a particular significance in Scotland. The meeting also provided a platform for Mr. Sydney Smith, newly appointed Chairman of the Scottish Gas Board, to explain something of his plans for its future and in particular the additional sales drive which he believed necessary in order to safeguard the Board's future prosperity. Finally, the meeting was exceptional in that it was denied the presence of the Association's President, Mr. Wm. C. Campbell (Paisley), due to illness. Accordingly the chair was taken by Mr. W. M. Gledhill, the Senior Vice-President, who explained that it was Mr. Campbell's wish that the meeting should proceed exactly as arranged. It was unanimously agreed that a message be sent to Mr. Campbell wishing him a speedy return to health, and that a tribute of flowers be sent to Mrs. Campbell. (At a later stage in the meeting Mr. Gledhill read the following telegram received from the President: 'Greatly regret my absence but wish your deliberations all success.')

Provost John Robertson warmly welcomed the delegates to Largs, and was thanked by the **Chairman,** who said that the popularity of Largs was evident from the fact that this was the third time in recent years that the Association had met there. He then extended a special welcome to Sir Harold Smith, K.B.E., Chairman of the Gas Council, and Sir Henry Jones, M.B.E., who was attending in his capacity as President of the Institution of Gas Engineers. Both had been present the last time the Association met in Largs in 1952.

Interesting Developments

Sir Harold Smith said that he had many happy memories of the 1952 meeting. On the present occasion he was singularly glad to be sitting alongside his old friend and colleague Mr. Sydney Smith, now Chairman of the Scottish Gas Board. He knew all of them extended their good wishes to Mr. Sydney Smith for the future. During the last few years, he added, great changes had been taking place in the methods of producing gas. They were not relying entirely on the sort of coal they used to rely on. The particular coal they would still like to have was in short supply and they had had to look to other raw materials in order to make gas and make it as economically as possible, in the circumstances ruling to-day. They had also turned to oil. 'We, of course, got a little warning about oil in the events happening in Egypt, but we have got to go on using oil to make gas and to use it as economically as possible.' Another interesting development was the carbonisation of low-grade coals, which previously they would never have thought of using, to produce an admirable smokeless fuel.

'Going round the various area boards as I do,' he went on, 'I do realise that the gas industry is far more on its toes than it ever has been. It is far livelier. I won't say how much of that may be due to nationalisation. Many of us disliked the idea of the nationalising of the industry and did all we possibly could to prevent it. But I am bound to say today that, in the conditions ruling now, we can do things in the industry we could never have done if we had tried to carry on as a thousand different gas undertakings, particularly when the supplier of our raw material was nationalised and was able to do the things that the National Coal Board have done.' Sir Harold concluded with the expression of the hope that, despite the unfortunate absence of the President, the Association would have a successful conference.

Sir Henry Jones, conveying good wishes from the Institution of Gas Engineers commented that the prosperity and health and vigour of an Institution or Association must depend upon the members it had and the contributions these members made to the work of the organisation. The Institution of Gas Engineers was fortunate in its members; so, indeed, was the Scottish Association. As President of the Institution, he said, he had had the good fortune to make some foreign travels recently and had been struck by the confidence and enthusiasm to be found in the gas industries in other countries. His most recent visit had been to Switzerland, where the country was being run in a most efficient manner. The Swiss were now getting their coal from America or Germany, France, and Belgium—they no longer got the 60% British coal they used to get. The gas industry there was a prosperous and forward-looking one, and the enthusiasm was very marked indeed. 'I do feel that when one sees what is going on in Great Britain it is essential that we as gas engineers should not allow the technical progress of our industry to get into any rut. We must always remember that

A cluster of leading lights at the Scottish meeting. Left to right: Sir Harold Smith, Mr. Sydney Smith, Mr. W. Gledhill, Sir Henry Jones and Dr. J. Burns.

what we did 20 years ago is not good enough for today. We must look for new sources of materials, and see that our gas boards give the best possible technical advice, and that we sell gas at prices which will be thoroughly competitive.'

Sir Henry was followed by **Mr. Sydney Smith,** Chairman of the Scottish Gas Board, who expressed his particular pleasure at being able to welcome to the area of his Board his own Chairman, Sir Harold Smith, his Deputy Chairman and, indeed, his former Chairman of the East Midlands Gas Board, Sir Henry Jones, and Mr. Martin Flett, Under Secretary of the Ministry of Fuel and Power; and he was delighted that the autumn meeting should have the honour of their presence. For himself he was happy to be present because it gave him the opportunity to meet so many at the one time. His greatest difficulty just now was to get out into the area as much as he would like. When he remembered that the Scottish Gas Board had taken over 196 manufacturing stations at vesting date, he realised that he had no more than scratched the surface.

An Outsize Area

He wondered if they had ever stopped to think that this areas of theirs, with its 30,400 square miles of territory, covered more ground than the Northern, North Western, North Eastern, East Midlands, West Midlands, North Thames and South Eastern areas all put together—seven of the English Boards' areas with 900 square miles left over for good measure. This gave some idea of the magnitude of his problem of trying to get around and shake them all by the hand. However, that was his headache, but he intended to visit all the Board's undertakings within a reasonable space of time, and to keep on visiting them.

In his travels he had become more and more concerned with the competition they were experiencing, particularly in the North. They had a stern fight in front of them but they would join issue in no uncertain fashion. The Board had already engaged a Press and Public Relations Officer and an Advertising and Publicity Officer, among a number of other Headquarters' appointments; and they intended to embark upon extensive publicity of all kinds. They would increase, where necessary, district sales and service representation throughout the area; they would increase considerably the number of home service advisers; and sales campaigns would be planned and implemented in all divisions and groups.

A Sound Investment

Overall these were formidable proposals and would involve considerable expenditure. This did not worry him unduly, however, because he looked upon it as a sound policy of investment; but he was concerned that all employees from senior officers downwards appreciated the part they must play in the scheme of things. It would be a complete waste of time, money and effort for the Board to incur expenditure on the lines he had indicated if, at the end of the day, with consumer interest having been created, their consumers did not receive the attention and service they required, and to which they were fully entitled.

Whatever their particular job might be, from the Chairman of the Board down to the office boy or girl, they were each and every one of them part and parcel of a selling organisation; part and parcel of a *service* because the Board's business was a public service and a commercial enterprise. Every single person's effort was required as a contribution towards providing a first-class, second-to-none service to consumers of gas throughout Scotland; and it must be realised that consumers were not in the least interested in *their* problems; they were concerned only with their own. So far as they were concerned, that meant prompt, pleasant and efficient attention to their wants; and it was up to the Board to see that they got it. If they did not get it, however, the electricity boys were round the corner and the ironmonger down the street sold both paraffin oil and the appliances in which to burn it. In very many cases, their consumers needed little encouragement to change their allegiance, and this in itself was a condemnation of the service they offered. It was much easier to lose a consumer than to regain a conconsumer. To retain an existing consumer required only a little more effort on the Board's part; but to connect a new consumer cost the Board a considerable sum of money.

Mr. G. B. Scott (left), of Uddingston, winner of the David Fulton medal, with Mr. J. M. Dow, Group Manager, Lanarkshire Division.

They were all concerned with average consumption per domestic consumer, and there seemed to be an attitude of mind abroad that if they got a cooker and a washboiler in a house, all was well. It was far from well. This was no more than their bread-and-butter load; and if they were to halt the present trend they must go flat out to sell and install additional appliances.

His listeners were probably saying: 'We've heard all this before.' Well, no doubt they had, but what of it? There was all the difference in the world between hearing and doing; and they had to start doing in no uncertain way. He knew that hire purchase restrictions were a serious draw-back but, they should be a challenge. The fact remained that there was more money about today than ever before; if they did not get their fair share of it, other sales organisations certainly would. It was up to them to meet the challenge from whichever direction it might come, and, in so doing, to show the stuff they were made of. If they did not, the consequences would be dire indeed. 'I'll give you a promise, gentlemen—the Board will support you through thick and thin; but remember that the results are in *your* hands.'

A Tribute

Before concluding, Mr. Smith referred to Mr. Donald Young, who was present for the last time in his official capacity. Mr. Young had held the responsible position of Controller of the Glasgow Division since vesting date—a period of over seven years. The duties had been onerous, and Mr. Young had reached an age when he felt that the added burden of a divisional re-organisation was something best left to younger men. He had, therefore, chosen to retire at the end of this month; and on behalf of the Board he would like to place on record their appreciation of Mr. Young's services. Mr. Robert Fife, Manager of the Kilmarnock Group, and Mr. R. L. Laing, District Manager, Brechin, had also asked to retire by the end of this year; but in their cases, on the grounds of ill health. 'Long and faithful service, like honesty and integrity, cannot

Mr. T. Shearer (Glasgow) escorts Mrs. Ford, wife of past president Mr. John Ford, and Mrs. Hannah, wife of the Association's Vice-President, Mr. G. Hannah.

be bought.' The Board was grateful to them, and they all joined in wishing them many long years of improved health and congenial leisure.

Mr. Martin Flett, Deputy Secretary, Ministry of Fuel and Power, remarked that he had few qualifications to address them. 'I am a Civil Servant,' he said, 'and Civil Servants are not supposed to make speeches.

'We at home have not realised how suspicious the outside world is about our chances of recovery and of maintaining a stable economy in the world. They are particularly concerned about our efficiency. You will hear them say that other countries are much ahead of us and that we are falling behind. It is of absolute crucial importance, therefore, that we should show that we are in the forefront of technical processes and advance and that we are at least as up-and-coming as any other country in the world. That depends very largely on the highly-qualified technologists in Britain. That is why I feel that you, as gas technicians, have got so much to contribute, and are contributing so much, towards our national prosperity. I would like to pay a high tribute to your industry.'

Tribute to Sir Andrew Clow

Mr. Gledhill said that the President had prepared a resolution placing on record the appreciation of the members of the Association of the services rendered to the Association by Sir Andrew Clow during his term of office as Chairman of the Scottish Gas Board. Sir Andrew, it was stated, had given to the gas industry in Scotland a lifetime of administrative knowledge and keen sense of public duty, and was quick to appreciate the value of the Association as a means of encouraging a highly-developed sense of public service and the broadening of members' interest as technicians. He had attended the meetings of the Association, often at great personal inconvenience, and had given his full support to the conduct of the Association's affairs. 'The fact that our Association has not diminished in stature through nationalisation, as many feared would happen, but has gone on from strength to strength, is due to his good offices on our behalf.' It was unanimously agreed that this resolution should be incorporated in the minutes of the meeting, and that an extract should be sent to Sir Andrew Clow.

The David Fulton Medal was then presented to Mr. G. B. Scott (Uddingston), the first recipient. Making the presentation, Mr. Fulton said that the medal was a tangible token of development in the technical requirements of the industry. 'We now have a standard which is equivalent to the standards of other professional institutions. This is a development for which I fought over a considerable number of years. That standard should be a real incentive for a young man to enter our industry. The fact that an industry demands certain standards gives it a prestige, and it is on the prestige of our industry that young men will be encouraged to make it the source of their livelihood. I would suggest that we should have a more systematic scheme of practical training in the works because in the past the system has been rather haphazard. The fact that it has had a considerable measure of success is due not to the system of training but rather to the merits and energies of the students themselves. That is not a thing on which any industry can depend always.'

Certificates in gas engineering were presented to Mr. J. H. Low, formerly of Burntisland and now in the service of the Melbourne Gas Company, Australia (his certificate was received by Mr. J. Webster, Burntisland) and Mr. V. Sutherland, formerly of Hawick and now of Cardiff.

Mr. Gledhill then announced that Mr. Gerald Nabarro, M.P., who was to have addressed the conference on the Clean Air Act, was unable to be present owing to the recall of Parliament.

The Symposium on Coke was then presented by Sir Henry Jones and co-authors Dr. J. Burns and Dr. F. J. Eaton.

Later Mr. Godfrey Wood (Galashiels) presented his paper on 'Coke Preparation.' This appears on p. 748, followed by a report of the discussion.

The conference approved the Council's recommendation of life membership for: Mr. A. McG. Clark, Greenock; Mr. L. Farquhar, Peebles; Mr. T. Mackie, Keith; Mr. J. Muir, Galston; and Mr. J. Smart, Monifeith.

Office-bearers were declared elected as follows:

President—Mr. W. M. Gledhill, Stirling.

Junior Vice - President — Mr. A. McFadyen, Dumbarton.

Mr. Gledhill was then installed in office by Past-President J. Ford, Inverness.

It was agreed that next year's meeting should be held in Bridge of Allan, with the later part of the meeting in Stirling, on April 25-26.

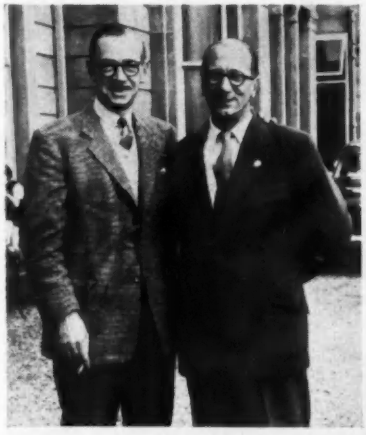
Our Cameraman at the meeting records—

SIXTEEN LADIES

–and only ONE MAN!

Above: *Golf prizewinners face our cameraman outside the Curlinghall Hotel.*

Golf



Mr. J. Pollock and Mr. J. Franklin, who tied in the golf and had to play three holes to decide, Mr. Franklin winning.

THE Autumn Competition of the Scottish Association of Gas Managers Golf Circle was played over the Routenburn course on Wednesday, when in Section 1 Mr. J. Pollock (76 – 5) and Mr. J. Franklin (82 – 11) tied for first place with the excellent score of 71. Playing-off over three holes, Mr. Franklin won the Challenge Bowl which thus goes south of the Border for the second time in its lengthening history. Mr. D. Beavis was third with 72 (76 – 4).

Section 2 winners were Mr. A. R. Barrack (91 – 18 = 73), Mr. D. Wilson (94 – 20 = 74), Mr. S. Hall (90 – 14 = 76). The visitors' first prize was won by Mr. Gordon Bennet with the lowest net score of the day (81 – 12 = 69).

The Annual General Meeting of the Circle was held in the evening at the Curlinghall Hotel. Members were delighted to find their Captain, J. D. Couper, well enough to attend in spite of his continuing ill-health.

Reference was made to the sound financial position of the Circle and to the membership, which now included 48 engineers and 46 traders. Mr. J. M. Dow was elected Captain for 1956-57, and Mr. Clifford King, Vice-President. New member of Committee is Mr. John Adams.

Mrs. J. D. Couper presented the prizes, was warmly thanked by Mr. Dow, and asked to accept a travelling clock as a memento of the occasion.

Finally, Mr. John Franklin dealt traditionally with the Challenge Bowl.

Ladies' Golf Circle

Meanwhile the Ladies' Golf Circle (Captain, Mrs. Clifford King; Secretary, Mrs. Lewis Fletcher) had been playing over the Largs Golf Club. The Handley Salver was won by Mrs. E. G. Smith. Other prize winners were Mrs. Fletcher, Mrs. Hall and Mrs. Bennet.

They, too, held their business meeting in the evening, and afterwards enjoyed a coloured cine record of past events, for which Mr. Jack Anstey (of Parkinson Stoves) had been producer-in-chief.

Right: *A group outside the club house.*

Above: *A line-up of the winning rink with their President, Mr. J. Ford, and Secretary, Mr. T. Thomson. The players were Mr. R. C. Meikle (skip), Mr. T. Shearer, Mr. W. Phairn and Mr. A. B. Briggs.*

Bowls

A COMPETITION was held at the Douglas Park Bowling Green; the Trophy being won, 7 shots up, by the following rink: Messrs. R. C. Meikle (skip), Wm. Phairn, Thos. Shearer, A. B. Briggs. The runners-up were Messrs. J. Muir (skip), J. Ford, J. Macmillan, T. A. Rowan.

Mrs. W. M. Gledhill presented the prizes in the regretted absence of Mrs. Campbell.

Mr. J. Thow was elected President of the Club for the ensuing year.

All the ladies were invited by the President and Council to tea at the Bowling Club.

Below (left): *Mr. R. C. Meikle receiving the bowls trophy from Mrs. Gledhill.*

Below (right): *A good head by Messrs. J. Ford, R. Cowie, J. Macmillan, W. T. Gilchrist, J. Muir, T. Rowan, W. Brodie and C. J. Gregg.*

President's Day of the Eastern Juniors

THE presidential meeting of the Eastern Junior Gas Association took place at the Gas Board showrooms, Colchester, Essex, last Saturday. Lunch, taken at the George Hotel, was attended by 133 members and guests and was followed by a coach tour of the Constable country.

Mr. E. S. Dennis (Colchester) was installed as President by the outgoing holder of that office, Mr. F. G. Cox (Norwich).

Presenting the accounts, the Honorary Secretary and Treasurer, Mr. H. E. Wilks, said the balance in hand showed a very healthy financial position. He also reported that membership was 180.

After the President had delivered his address, a vote of thanks, which was to have been given by Mr. J. L. Ireland, who was indisposed, was read by Mr. Caston-Forbes.

And then Mr. Cox was presented with an illuminated address by Mr. R. C. Wardell (Boston), in appreciation of his services to the Association during the past year.

Mr. R. Whiting, General Manager, Ipswich Division, at the luncheon, which was by invitation of the Eastern Gas Board, proposed a toast to the Eastern Junior Gas Association.

The Association had progressed considerably in its quite short life. 'I do know that your progress has been all that might be hoped for. You have established a very nice set of customs and traditions already—in your ceremonial meetings at the beginning and the end of the term of office of your President.'

Responding to the toast, the President said the Association had been very grateful to Mr. Whiting for the keen interest he had shown in their activities. Extending a warm welcome to all the guests he pointed out that they were honoured with the presence of Mr. D. B. Parkinson, M.B.E., Area Liaison Engineer of the Board, and his lady, and he also welcomed the President of the Eastern Section, I.G.E., Mr. R. C. Wardell, and his lady.

The success of the Association, said the President, had been largely due to those who had taken the helm, particularly his friend and colleague, Mr. Reg Hilham, who was its first Secretary.

Mr. W. F. Pritchard, Junior Vice-President of the Association proposed the toast of the Eastern Gas Board, and Mr. D. B. Parkinson, M.B.E., responded.

Mr. Parkinson conveyed the regret of Sir John W. Stephenson, C.B.E., Chairman of the Board, and Mr. J. H. Dyde, Deputy Chairman, that they were unable to be with the Association that day.

The afternoon's tour had the benefit of perfect weather.

The Scottish Association and the

SYMPOSIUM ON COKE

The Symposium on Coke was prepared by a number of authors five of whom were members of a Panel appointed by the Gas Council to investigate any production techniques which would increase the quantity of gas coke available for sale, particularly to domestic consumers. The papers had previously been discussed at Newcastle, Birmingham and Bristol. At the Autumn Meeting of the Scottish Association of Gas Managers at Largs the Symposium was presented by Sir Henry Jones, M.B.E., *Deputy Chairman of the Gas Council and co-authors Dr. J. Burns, B.Sc.,Ph.D., M.Inst.Gas E., F.Inst.F., Chief Engineer of the North Thames Gas Board, and Dr. F. J. Eaton, B.Sc., Ph.D., M.Inst.Gas E.*

Sir Henry Jones:

'I am particularly glad to be present at this meeting in Scotland because part of the Symposium deals with the technique of carbonising weakly caking coals in order to produce free-burning coke in increased quantities from existing plant. This technique has been studied at Edinburgh and the results of the work published by Jamieson and King as long ago as 1938, and conditions in Scotland seem to be peculiarly suitable for an increased production of reactive coke from existing plant using Scottish coal.

'I think that the key to the whole problem of providing smokeless fuel is contained in a paragraph on p. 4 of the Symposium which is part of a paper of which I was the author and which reads as follows:—

> "The consumption of coal by domestic consumers was estimated by the Beaver Committee as 36.8 mill. tons per annum. Of this amount the Report of the Committee states that 19 mill. tons are bituminous coal used in the black areas, which are described in the Interim Report, and that this coal should be replaced by gas, electricity and solid smokeless fuel. The policy of replacing this coal with smokeless fuels has been accepted by the Government."

'Part of this 19 mill. tons of bituminous coal will be replaced by gas and no doubt some by electricity. In the long run there will be increasing use of more convenient fuels among which gas is pre-eminent, and it is possible that in 15 or 20 years' time the pattern of fuel utilisation may have changed considerably. But having regard to the construction of dwellings in this country which depend overwhelmingly on solid fuel for their heating, and having regard to the scale of investment which would be needed if any attempt were made within the immediate future to replace all house coal by gas, electricity or oil, it seems certain that solid smokeless fuel must be provided in adequate quantities and of suitable quality if the Clean Air policy of the Government is to be implemented successfully; and if, to quote the Beaver Committee, "an immediate and substantial start" is to be made, gas coke is the only solid fuel available at the present time which is smokeless and also obtainable in quantities sufficient for this "substantial" beginning.

'On p. 5 of the Symposium the present production of smokeless fuel is set out in millions of tons as are the quantities which were used in 1954 in the domestic market. The extra quantities of coke which the Panel believe could be made available for sale fairly quickly are set out on p. 9 together with the quantities of coal which would be needed. Given 3 mill. tons more coal about 2½ mill. tons of additional coke could be offered for sale with 300,000 tons of additional breeze. These quantities are additional to the coke which could be transferred from industrial and commercial consumers to the domestic market which the Gas Council told the Beaver Committee might amount to 4.6 mill. tons per annum. While it is true that these quantities of coke will not replace all the bituminous coal used in the black areas, they are sufficient to enable a substantial start to be made with the Clean Air policy.

'There is no doubt that altering methods of gasworks operation and changing the flow of coke from large industrial to small domestic consumers will both add to the costs of coke supply and coke is unlikely to be sold at prices lower than those which apply to a comparable quality of house coal. However, coke burnt in the open fire will give out much more heat than the same weight of coal. In some cases two tons of coke will replace three of coal, and the Beaver Committee accepted as a principle that often no more than 15 cwt. of coke is required to replace a ton of coal used in the home. Even the canny Scot, therefore, will be justified in paying a higher price per ton for smokeless fuel if it can be shown that this means paying a lower price per therm of useful heat.

'It is sometimes said that the gas industry's conception of providing fuel for Clean Air by gas and coke will not bear examination because, first, the amount of the necessary quantity of coal cannot be provided, and second, that if it can be provided it could not possibly be of the good coking quality which the gas industry requires. Neither of these criticisms is valid. One ton of coke carbonised at the gasworks will provide gas and coke in sufficient quantities to replace more than one ton of raw coal used in the domestic hearth. The use of gas and coke in place of coal would therefore reduce the total quantity of coal needed and not increase it. Secondly, for the production of free burning coke suitable for the open fire there is no need to use high grade coking coal, indeed it is the last kind of coal that is really necessary. The papers by Mr. W. Hodkinson and Mr. W. R. Branson with Mr. E. T. Pickering, together with later information published by Dr. Burns in his paper to the Institute of Fuel, show that low rank or weakly caking coals are better than strongly caking coals if the aim is to produce a free burning coke. In Scotland the coals traditionally used by the gas industry have been of the weakly caking type, and it is believed that if once a start can be made with the Clean Air policy by the use of increased quantities of gas and coke in place of house coal, much of the house coal displaced will be found to be eminently suitable for carbonisation thus enabling an expansion of Clean Air zones, or, to use the proper phrase, Smoke Control areas.

'My last point does not arise directly from the Symposium, but relates to the general question of heat supply to the home. The gas industry is accustomed to fair competition, and it has always met it. There are, however, ways in which housing authorities, public and private, can be influenced in the provision of heat services by considerations other than the simple merits of the competing fuels. For the best use of existing carbonising plant increased production of both gas and coke is desirable, although not necessarily in a constant ratio. If, on account of tactics which are designed, by the imposition of unfair conditions regarding the installation of appliances or otherwise, to restrict the use of gas, the demand for gas fails to develop, the availability of its companion fuel coke is likely to be restricted, the part which the gas industry can play in assisting in the Clean Air policy will be unduly limited, and the rate at which smoke control areas can be introduced will be retarded.'

Dr. J. Burns:

'I shall endeavour to deal quite shortly with the factors affecting the relative outputs of coke and gas in the carbonisation of coal, to point to some of the economic factors which may determine our method of approach, and perhaps indicate some new developments which may be of interest to you.

'It is probably quite unnecessary for me to tell you that coal is by no means a material of simple composition; it varies widely in character and, so far as we are concerned, one of its principal characteristics is its rank, which really determines its suitability for the manufacture of gas and coke. The industry generally uses coals of rank 400 up to rank 800—the higher the number the lower the rank. Coals of rank lower than 700 are, generally speaking, used for domestic and industrial purposes while coals of rank higher than 400 are used for steam raising purposes. Gasmaking coals in Scotland are generally of low rank, while the highest ranked gasmaking coals come from Durham. Now the rank of the coal very materially affects the throughput which can be obtained in the continuous vertical type of retort, and thus the amount of coke which can be produced from a given unit of plant. If, therefore, the throughput of rank 800 Scottish coal be placed at 100, the throughput of Durham coal is only 73. Then we all know that coal size materially affects throughput, and if you have a "nut" coal and we consider that at 100 the throughput of a slack coal with 70% below ½ in. will be in the region of 80.

C.V. the Most Important Factor

'Perhaps the most important factor, however, which affects coke and gas availability is the calorific value of the gas produced and here, of course, I refer to carbonisation in the continuous vertical retort type of plant with steaming of the coke to produce blue water gas for dilution purposes. The higher the degree of steaming—in other words the lower the calorific value of the gas produced—the lower is the throughput which can be obtained for the heat which is used in the endothermic reaction between steam and coke for the production of blue water gas is not available for the carbonisation of coal and we can qualify it in this way: That if the throughput of coal in a continuous vertical retort producing gas of 500 B.Th.U. is placed at 100 the corresponding throughput for gas of 450 B.Th.U. per cu.ft. is 83 but, quite apart from the question of throughput, the yield of coke is directly affected by the calorific value of the gas produced, for coke is used up in the manufacture of blue water gas for dilution purposes. The average calorific value of gas produced throughout the country is in the region of 475 B.Th.U. per cu.ft., and a change in the calorific value to 500 would materially increase the availability of coke. I do not think there is time to go into details on the raw material balances between coal, coke, benzole and gas, but I would refer you to the graphical representation of this set out in pages 18-22 of the Coke Symposium, and you will see there the effect of calorific value, the effect of carburetted water gas and the effect of benzole extraction on coal usage and coke availability for a given quantity of gas.

'We have thus available to us a very high degree of flexibility in our approach to the production of gas, using coal, coke and oil as our raw materials and products. But the obvious question to ask is: "Which is the best way to operate in order to give the best average economic results?" and here the major factor is the net return which can be obtained for coke.

'I refer you to Fig. 4 of the Symposium on Coke on p. 25 and there you will see set out the cost of gas production plotted against varying values of coke and breeze for one specific coal price and it will be seen that where the coal to coke ratio is 1: in other words, where the price of coal is exactly equal to the net return that you get from your coke there is no major difference economically in working at 500 or 450 B.Th.U. gas. When the net return for coke is higher than the price you have to pay for coal then it pays to work at the higher calorific value. You will remember, of course, that this does not take into account any advantages which do arise from the distribution of gas at a high calorific value and you will also remember that distribution costs are *pro rata* to the volume of gas and decrease as the calorific value arises.

'You may very well say that it is not feasible to expect a higher net return for your coke than you have to pay for your coal and this opens up the whole question of the relative suitability of coal and coke for heating purposes. This is not a subject into which I have any intention of going at any great length, but it will be remembered that the Beaver Report sets out quite clearly that in effective heat production 16 cwt. of coke are the equivalent of 20 cwt. of coal. There are prejudices against the use of coke in some few and very unenlightened quarters but on our part we have got to see to it that the material we sell is properly sized and graded and properly free from breeze.

'It is interesting to remember that the gas industry is probably the biggest individual user of coke for heating purposes and the amount consumed by the industry per annum is tremendous. Each individual retort house uses at least 10% of the coal it carbonises in the form of coke for providing the heat for the reaction. This coke may be of the industrial type or the type not generally suited for domestic heating and much can be done to release good reactive vertical retort coke for domestic purposes by the use of industrial coke from static carbonizing plant in retorts and we are doing that generally as a policy in my Board. Then there is the possibility of using alternative fuels for heating and the fashionable one at the present time is oil. We are carrying out some very interesting work just now in the production of a producer gas from oil which, if it is economically suitable and proves technically sound, may result in the release of coke. Producer gas may also be supplied from non-coking coal but the difficulty with many of these things is that the setting design is not always suited for this sort of gas.

'I will say very little on the subject of coke for boilers but would only mention that the engineer who uses coke on a boiler for steam raising purposes should be thoroughly ashamed of himself. There are now admirably designed mechanical grates which allow the use of breeze on even the smallest boiler, and where the capital investment is not suited for such an installation the steam raising should be done by oil firing.

Low Rank Coal

'I now come to a very interesting development which has the tremendous merit of having started in Scotland itself, namely, the production of reactive coke from specially selected low rank coal. I refer, of course, to the production of Grancole at Granton in Edinburgh well before the war. Now this work has not perhaps developed to the extent that it should because in Scotland, of course, it was not quite so novel as it would have been in other parts of the country which were accustomed to using much higher rank coal for the production of gas. This work, however, was continued at the Fuel Research Station after the war where low rank coal was carbonised in intermittent vertical retorts for the production of reactive fuel. It was continued on an experimental scale in the West Midlands Gas Board and there is a paper written by Branson and Pickering describing this work. We in the North Thames Gas Board saw the possibility of this, especially in conjunction with the Clean Air Bill where there appeared to be a call for greater quantities of free-burning solid smokeless fuel without necessarily the corresponding traditional increase in the production of gas and we set out, too, to investigate this job on a large-scale primarily to determine the economics. During last summer and again this summer we carried out work on the 500 ton per day scale.

'We had a very special interest in this work because up to the present time it did not appear to be possible to produce gas of 500 B.Th.U. and over from this low rank coal and I think our measure of success in this work has been to demonstrate that it is possible to make 500 B.Th.U. gas from the low rank coal of 801 rank that we employed and at the same time to produce a very reactive fuel. The big advantage of producing gas of 500 B.Th.U. is, of course, that this particular method of operation can be accommodated within our normal operation, for the declared calorific value of the gas we sell is 500 B.Th.U. That is important but what is equally important is that we get the advantage of the very high throughput associated with the high calorific value gas, and our trials show that we can increase the throughput of coal by up to 50% in some cases with a corresponding increase in the availability of coke. Even the gas yield per day is increased by some 15% and the solid fuel produced is a material of first-class burning qualities.

'All this does, of course, materially affect the economics of operation. The loss of gas in therms per ton is a grievous one, but I have shown in a paper to the Institute of Fuel, presented in May last, that this loss can be recovered to some extent by the greater throughput of coal which, in turn, affects capital costs and labour costs. I think this study is quite important because it does provide a greater supply of solid

smokeless fuel which can be burned effectively in an open grate and, above all, it opens out a new source of raw material to the industry in the shape of this low rank coal from the East Midlands. Supplies of suitable coal may not be extensive at first sight but I think what is important, of course, is that these coals at the present time are being used in the domestic market and that is exactly the type of coal we wish to displace. All I can say about this project, in so far as my own Board is concerned at the present time, is that large-scale work will surely continue.'

Dr. F. J. Eaton:

'My task is to present the points raised in two papers of the Symposium, that by Mr. J. E. Davis, and the paper prepared by Dr. Burden and me. Both of the papers with which I deal stress the importance on coke quality of two factors: First, the coal rank, and secondly, sizing. All the work which has been done since the papers were written has confirmed this view, indeed almost to the point where these factors swamp everything else.

'Mr. Davis deals with the problems confronting the gas engineer who carbonises coals of high rank in static carbonising plant. He makes it quite clear that it is more difficult to make a satisfactory open fire coke, but states that this can be done, provided carbonising conditions are chosen so as to leave not less than three volatile therms per ton in the coke. If Yorkshire coals were substituted for Durham, then a volatile therm content of not less than one would be satisfactory. Figures are given for the open fire performance, based on the amount of gas required to give satisfactory ignition for static and continuous vertical retort systems using Durham and Yorkshire coals. These figures are as follows:—

	Cu.ft.
(i) Durham coal, horizontal retorts	13
(ii) Durham coal, continuous vertical retorts ...	11
(iii) Yorkshire coal, horizontal retorts	9
(iv) Yorkshire coal, continuous vertical retorts ...	6

'From these figures it will be seen that for cokes of the same volatile therm content, the effect of changing coal rank is about twice as great as the effect of changing from a horizontal retort to a continuous vertical retort plant.

'Since the rank of the coal plays such an important part in the quality of coke produced, and the 28 mill. tons of coal carbonised by the gas industry contain a wide variety of coals, it is not surprising that there is a considerable difference of opinion between boards on the standard of quality which should be included in the specification for coke recommended by the Beaver Committee. Ultimately, it is the user who decides the level of quality and he will only use and pay for a fuel which suits his requirements. Because of the importance of user opinion, about half of the paper by Burden and Eaton is devoted to an analysis of consumer opinions as indicated by the examination of consumer complaints. These figures, of course, only apply to the London area and it may well be that the north of England and Scotland (traditionally coal burning areas) may require a quality different from that which would be acceptable in London. One point, however, which is common throughout the country, is that the coke should be well sized and by this is meant the percentage below ¼ in. should be small, and the view is now taken that not less than 95% should be within the limits of ¼ in. to 2½ in.

'I would now like to deal very briefly with the measurement of coke quality. You will all be aware of the difficulty of this measurement and of the many different tests which have been suggested in the past. The three methods which have been considered by the Coke Quality Panel of the Gas Council are—the fire test recommended in the 1951 Coke Quality Report, the C.A.B. and the volatile therm test. We have also had many discussions and carried out a joint programme of testing with the Carbonising Division of the N.C.B. on this problem. The result has been that agreement has been reached to use the fire test as the method of measuring coke quality best suited to a specification for coke for household use on the open fire. Agreement has also been reached on the installation of the fire and the use of the Moll thermopile to measure the radiation output.

'A further important point to be considered is the method of sampling and the reporting of coke quality results. At present a number of gas boards are working to a draft procedure which is briefly as follows:—Two 1-cwt. increments are taken on each of five days per week, the increments being collected as the coke is loaded for sale. The two daily increments are mixed and determinations made of—(a) moisture %, (b) ash %, (c) size analysis %, material between the limits of ¼ in. and 2½ in. square mesh, and (d) fire test, ignition time to radiation output of 5,000 B.Th.U. per hour, using 7,000 B.Th.U. of gas for lighting. From the analysis of existing data it appears likely that sufficient increments will have been taken in a four-week period for the average values over this period to represent the quality of coke being produced.

'The results of the further tests now being made will confirm whether it is necessary to increase this period or whether it will be possible to accept a shorter period or alternatively, fewer increments. In any case, the view is taken that the British Standard Specification must be on a basis of average values with the addition, possibly, of an upper limiting value with a probability clause. For example, it may be that the ignition time on the open fire on average could be 40 min. and not more than one in twenty samples should exceed 50 min. These figures are given by way of illustration and I would stress that the actual figures will depend upon the results of tests now being undertaken.

'There is no doubt that the Beaver Committee, in asking for this specification, have set the industry a very difficult problem, much more difficult than the problems associated with the declared calorific value of gas, because with coke we are dealing with solid material and the difficulties of sampling are well known. I would further point out that no domestic solid fuel has ever been subject to a specification, although it is true that both coal and coke have been sold on specification, in bulk, to industry. I believe that from the work which has been done and is being done by the boards, a realistic specification can be achieved. In arriving at a final decision, the views of all sections of the industry must be taken into account.'

DISCUSSION

Mr. T. S. Ricketts, Chief Engineer, Scottish Gas Board, opening the discussion, said that the 'Symposium on Coke' was very important to the Scottish Gas Board. When the paper had first been published in November, 1955, it had aroused great interest and not a little doubt was cast upon some of its contents, particularly from the aspect of the conditions appertaining to Scotland. One of the principal points upon which controversy arose in Scotland was with regard to the apparent increase in coke production which could be obtained if the calorific value of the gas produced in continuous vertical retorts was increased by increasing throughput of coal and reducing the amount of steam added to the retort. It was the practice in Scotland to produce gas from continuous vertical retorts at a lower calorific value than was usual in England and Wales, this being due to the ease with which Scottish coals were steamed and, up to the present, economics had favoured this method of working. From the paper it could be seen that the average calorific value of the coal gas produced in Scotland was only 433 B.Th.U. per cu.ft., while, for instance, in the Eastern, the North Thames, and the South Eastern Boards—to name but three—it was higher than 500 B.Th.U. per cu.ft. The average calorific value of all gas produced in continuous vertical retorts in this country at the present time was approximately 475 B.Th.U. per cu.ft.

Although it had not been categorically stated in the report that the calorific value of the gas produced from verticals in Scotland should be increased from 433 to 475 or 500 B.Th.U. per cu.ft., nevertheless the implication was present in the symposium. Long-established practice died hard, however, and it was therefore with some little consternation that gas engineers in Scotland listened to this symposium, the general feeling being that with the class of coal supplied in Scotland such calorific values were not possible.

There was therefore only one thing to do and that was to carry out practical tests on as many types of continuous vertical retorts in Scotland as was possible, using the lowest rank of coal—800 or 900 and under controlled conditions—to establish to what level the calorific value of the gas produced could be raised. These tests had now been carried out. The retorts used had been Glover West 50-in. retorts, Woodall-Duckham 82-in. retorts, and Woodall-Duckham 103-in. retorts. Without going into details, it had been proved that in most

cases calorific values of 500 B.Th.U. per cu.ft. could be obtained, while in all cases calorific values of 475 B.Th.U. per cu.ft. could be obtained when using the 800/900 rank coal from Fifeshire and the Lothians.

The tests had been carried out to prove the practical possibility of producing higher calorific value gas and not with a view to proving the economics. That was quite another matter. The economics of the case would be justified by the return obtained from the increased coke which would be made available. If the demand and the price were sufficiently attractive then they had proved that they could increase the output of coke per retort.

It had been very quickly revealed in the tests that the production of higher quality coal gas from continuous vertical retorts demanded more stringent maintenance and technical operation. There were in the area of the Scottish Gas Board many installations of continuous vertical retorts which, mainly owing to their age, were not in good condition, and owing to the small size of plant and lack of staff were not receiving the highest skilled attention. From these installations the coal gas produced was a mixture of straight coal gas, water gas, and waste gas. The tighter the retort the less the amount of waste gases and hence the higher the calorific value for a given amount of steaming. With poor retorts and indifferent conditions of pressure at the retort offtake, then undoubtedly it was practically an impossibility to make 450 c.v. gas when using low rank coals. This observation was probably as old as the gas industry, but nevertheless it was as important today as it had been many years ago, and there was no doubt that without good housekeeping in the retort house one could not produce high c.v. gas.

Much Breeze but High Reactivity

As to the type of coke produced from low rank coal, it was unfortunately true that breeze produced was very high, probably being more than 30% from the poorer Fifeshire coals. The size of coke, too, was much smaller than was usual in England and Wales, but a good deal of compensation was provided in the very high reactivity of the coke. He had lived in North London and in Wales, in both of which places the coke produced was at times very unreactive and very difficult to keep alight. The change to Scottish coke was really remarkable, and a Scottish coke produced from low rank coal of, say, size ¼ in. to 1¼ in. would burn as easily as a coke of size 1¼ in. to 2 in. produced in England.

As for the future production of coke in Scotland, it had been stated that an additional 600,000 tons of coke—he thought this figure was the basis of the panel's report—could be produced in the area of the Scottish Gas Board by increasing the c.v. to 500 B.Th.U. per cu.ft, of all the gas produced in continuous vertical retorts in Scotland. In spite of his foregoing remarks upon the results of the tests carried out in continuous vertical retorts, he thought this figure should be treated with caution. They could increase the c.v. of the gas from some of the larger and better of their installations, but there were many small installations which were physically incapable of so doing. These small installations would be progressively closed down as a result of integration in the future, and possibly many small works could cease production in this way during the next few years. It should be mentioned that when they examined their integration plans it was obvious that there would be considerable advantage in increasing the c.v. of the gas to be distributed from 425 B.Th.U. to 475 B.Th.U. per cu.ft., the consequent reduction in pipe diameter or, alternatively, in pumping pressure, resulting in considerable financial savings.

Production at these small works would be replaced by carbonisation plants at the larger gasworks operating more efficiently and using less coal. Many of these small works were incapable of working with a high efficiency, had a very poor load factor, and a high fuel consumption. This resulted in a low figure for coke for sale.

Another factor was the availability of coke oven gas. If changing circumstances in the future should make available to the Board an additional volume of coke oven gas of, say, 20 mill. cu.ft. per day, this coke oven gas would replace gas produced by the carbonisation of coal, with resultant coal saving of approximately 400,000 tons per annum; consequently coke production would be reduced by a considerable amount.

They were very conscious of the fact that coke was too valuable a fuel to be used on gasworks for steam raising purposes when cheaper lower grade fuels were available. The use of coke on gasworks for steam raising had been discouraged and investigation was being carried out into every steam raising installation in the Board's area. Coke would not be used for steam raising in the future; lower grade fuels such as breeze or, in certain cases, creosote, would be used instead.

The majority of works in Scotland were short of efficient coke screening and grading plant. If they were to meet an increasing demand for coke in the future this deficiency must be remedied, and the Board had undertaken an examination of existing coke screening arrangements with a view to making recommendations for improvements where desirable.

The pattern of gas manufacture and distribution in Scotland must undoubtedly change in the future if it was to keep its place under modern economic conditions. Whether more emphasis would be laid on the production of gas from oil depended, of course, on the economics of the process, but undoubtedly if the demand for coke in the future became sufficiently high, the continuance of the carbonisation process would be encouraged.

Price of Gas Must Not Rise

Mr. A. McFadyen, Dumbarton, said that the introduction of the Clean Air Bill presented opportunities to the gas industry, but in his opinion nothing should be done which would, eventually, increase the price of a therm of gas. When Dr. Burns had addressed the Scottish Junior Gas Association in Glasgow last March and suggested increasing the c.v. of gas manufactured in Scotland several contributors to the discussion emphasised that to carbonise Scottish coals for higher c.v. would tend to weaken the economy of the Board . . . . recent tests carried out in Scotland had proved this to be so. The authors of the Symposium on Coke had indicated that larger quantities of coke could only be manufactured by increasing throughputs and by producing higher c.v. gas. Increased throughputs of coal could only be obtained by using larger quantities of low-rank coals. It was his opinion that to produce higher c.v.s on existing coals would not be economical, and he was certain that to produce higher c.v. using greater quanties of low-rank coals would be financially disastrous.

He had studied with great interest the discussions on the Symposium and he had been distressed to find so many speakers who so easily solved the economics of our industry by demanding a coal/coke ration of 1.0 to 1.5. The true value of coke, as compared with coal, was about 1.125 to 1.0, and he could not understand how they were expected to obtain 1.5. There was in Scotland a resistance by domestic consumers to the use of coke in place of coal, and to attempt to break this resistance with a 1.0 to 1.5 coal/coke price ratio was impossible. He knew that the Clean Air Act would grant far-reaching powers to local authorities to insist upon the use of smokeless fuel, but those compulsory powers would become all the more unacceptable if they had to be applied along with a 40% increase in the price of coke. What then can the gas industry do to provide more coke and at the same time improve its economy? The people in control of the Scottish gas industry had led the way by insisting that certain fuels should not be used for steam raising in boilers, and that a clear definition should be made of coke and of breeze.

In Scotland 310,000 tons of coke breeze were produced annually, and he was doubtful whether there was not included in this tonnage approximately 100,000 tons of what he might term coke suitable for producer fuel. In addition, if the coke available for sale per ton of coal was increased in Scotland by 1 cwt. per ton, a further 120,000 tons of coke would be available.

They also had to look to the enormous amount of coke used in producers. He believed that the Scottish figure would be approximately 3.15 cwt. per ton of coal carbonised which was roughly 400,000 tons per annum, but since most of the undertakings in Scotland did not weigh the coke used in producers, then perhaps this figure might be half a million tons. To weigh the coke to producers would not, in itself, provide any additional coke, but it would show clearly how efficient, or how inefficient, they were.

If they looked to their producers, their boilers, and their grading of coke as distinct from breeze, perhaps there would be sufficient coke available in Scotland for many years after

the introduction of Clean Air, but more important than that, their economy would be improved to such an extent as to permit a lower selling price of gas.

Although it was believed that considerable amounts of what was presently termed breeze were, in fact, tons of good coke, and could easily be used in existing producers, he emphasised that there was much greater scope for the use in producers of what was really breeze, provided, of course, that capital was invested to utilise the breeze efficiently in the producers. Again, there should be consideration given to the heating of settings by coal gas obtained in special plant designed to utilise the lower-rank coals.

If there was substance in his opinion that, above all things, a low-cost therm was their chief selling point, then their output would increase and consequently coke would be available in greater quantity; and he sincerely hoped that low-rank coals would not be added to their allocation to make the greater quantity of gas, but that there would be a policy whereby suitable coals would be diverted to the gas industry.

Price Stability Fundamental

Sir Henry Jones, in reply, said he could speak for all of them in saying that the last thing any of them would like to see would be an increase in the cost of making gas. That was fundamental. The economics of the carbonising process depended upon the revenue from gas and coke. The revenue from coke must be such that the carbonising process remained economically possible. No Board, he hoped, would embark on a policy leading to financial disaster, and whether or not the processes they had under discussion—increasing the calorific value, increasing the throughput of coal, increasing the output of coke—whether that paid at any particular works was a matter for very close examination. On the coal-coke price ratio, they were not talking about the ratio in the consumer's home and this brought them back to the coal price structure of the National Coal Board. What they were talking about was the cost of coal at the gasworks, and many of them felt that the formula adopted by the National Coal Board had led to the gas industry paying a higher price for coal. What had to be taken into account was what the gasworks was paying for coal and what the consumer had to pay for coal in his house and therefore the sort of price he was prepared to pay for coke. A ton of coke would give more heat than a ton of coal, and therefore coke was intrinsically worth more than this coal. They entirely agreed about the use of good carbonising coal by other industries. 'We should have our fair share of the good carbonising coals, provided they will indeed lend themselves to increased throughput at our plants.' There was more than double the amount of good carbonising coal coming out of the ground than used for the carbonising industry. There was much scope for alteration in the arrangements so that the cleaner coals go to the gas industry and the coals that were wanted only for burning go to the workshops. They must get away from the main theme of the gas industry for many years past on coke utilisation. The object of their exercise in the symposium was to get more coke out of their retorts and, flowing from that, if they were going to put that extra coke into the domestic market, could they carbonise the low rank coals? The main object was to make more coke of a suitable type for use in coke ranges. Why try to make that reactive coke? They could not rely on burning the old-fashioned coke in the ordinary grate. There were a lot of properties which would be pulled down in a few years' time but in the meantime they had to be lived in. The people there were not going to be very willing to spend substantial sums in putting in special grates in that type of property. The ability to market a special coke at a special price which would be interchangeable with coal might be a very valuable thing for the gas industry to be able to do.

Dr. Eaton: If you are going to try and win people away from coal, then I think you want combustibility. I do agree that ash is an important factor, but it is a convenience one and not one that shows up in the fire test.

Mr. C. A. Poulson, Glasgow, stated that the subject increased in importance, not only because of the proposed smokeless zones, but now, with a possible changing picture of the world's oil supplies, it would be necessary to produce the maximum amount of coke from roughly the same tonnage of coal they were at present carbonising. The amount of coal carbonised must depend upon the sale of gas rather than the sale of coke, because they could not make substantially more coke for sale unless they could sell the inevitably greater quantity of gas made.

There was no major difficulty in producing high quality gas with Scottish coals, but the first consideration of the gas-making process must be to produce the cheapest therm into holder and, with the present low differential between the cost of coal and the price of coke, the cheapest therm is produced with Scottish coals, which have a higher steam reaction than most English coals, when making gas at around 425 B.Th.U. per cu. ft. They must, therefore, make coke production flexible in relation to the amount of gas required and this could be accomplished to a considerable extent by reducing the consumption of large coke in the overall works' process to manufacture a given output of gas. Mr. Poulson suggested the following possibilities were open for increasing the amount of saleable coke when using Scottish coals:

First; by a reduction in the thickness of retort walls, to allow quicker heat interchange to the coal charge, and so to reduce fuel consumption; this could safely be done with non-caking coals.

Second, maximum waste heat should be recovered. One pound of steam was equivalent in value to one therm of gas, and in this way 3½ therms, in the form of steam, could be generated by waste heat from every pound of fuel charged to the producers.

Third, the use of the lower fractions of coke for heating retort settings. They had experiments in progress in Scotland using breeze in mechanical producers, with some modifications, and it appeared possible to use dedusted ¼ in. to ¾ in. breeze entirely, which would release an increased proportion of large coke for sale.

Accelerated Carbonisation

On the question of accelerated carbonisation with Scottish coals, and using blue water gas as the carrier, he had found, from experiments made, that no additional weight of coke was made per ton of coal carbonised, and, therefore, the cost of gas into holder was not reduced.

Trials had been made with Scottish coals, using steam as the carrier, and the results indicated possibilities well worth pursuing for low rank coals, with which no stickiness was experienced at the top of the retort by the additional steam.

Mr. Poulson added that they should, however, consider the complete gasification of low grade coals for the production of low grade gas, to use as the carrier, and this process would produce a cheaper carrier medium and would not absorb plant which may be required for peak load purposes. It would be desirable to develop the gasification, in mechanical producers, of low-grade coals for heating the retort settings which would release for sale some 3 cwt. of additional coke per ton of coal carbonised, but the price paid for low grade coal would be all important.

Possibly the combination of complete gasification and carbonising plant could, with advantage, be carried a stage further. If they could get a low grade coal, at a favourable price, they could gasify it, and use the gas both as fuel gas in the setting and as carrier gas in the retorts. The ratio of coke to gas production would be thus very considerably increased.

The application of gas firing of settings by town gas had been successfully carried out but, before this became an economical proposition, the price ratio between coal and coke must be favourable, which at present it was not.

Experiments were also being considered for the partial use of oil in producer firing, but here again cost of oil was the main consideration. They had to meet the challenge to produce a refined clean solid smokeless fuel of constant quality, and to sell this high grade produce at a justifiably higher price. They had to advertise the fact that 16 cwt. of *good* coke could do the work of one ton of coal.

For the weakly and non-swelling coals, of which there was a preponderance in Scotland, he believed it would be necessary to experiment with some rapid form of carbonisation to develop coking properties of poorly coking coals. In this connection, radiant heat carbonisation was a possibility, but it necessitated briquetting and second stage carbonisation to give a smokeless fuel.

The gas industry now had a unique opportunity in the production of smokeless fuel, and it must undertake considerable

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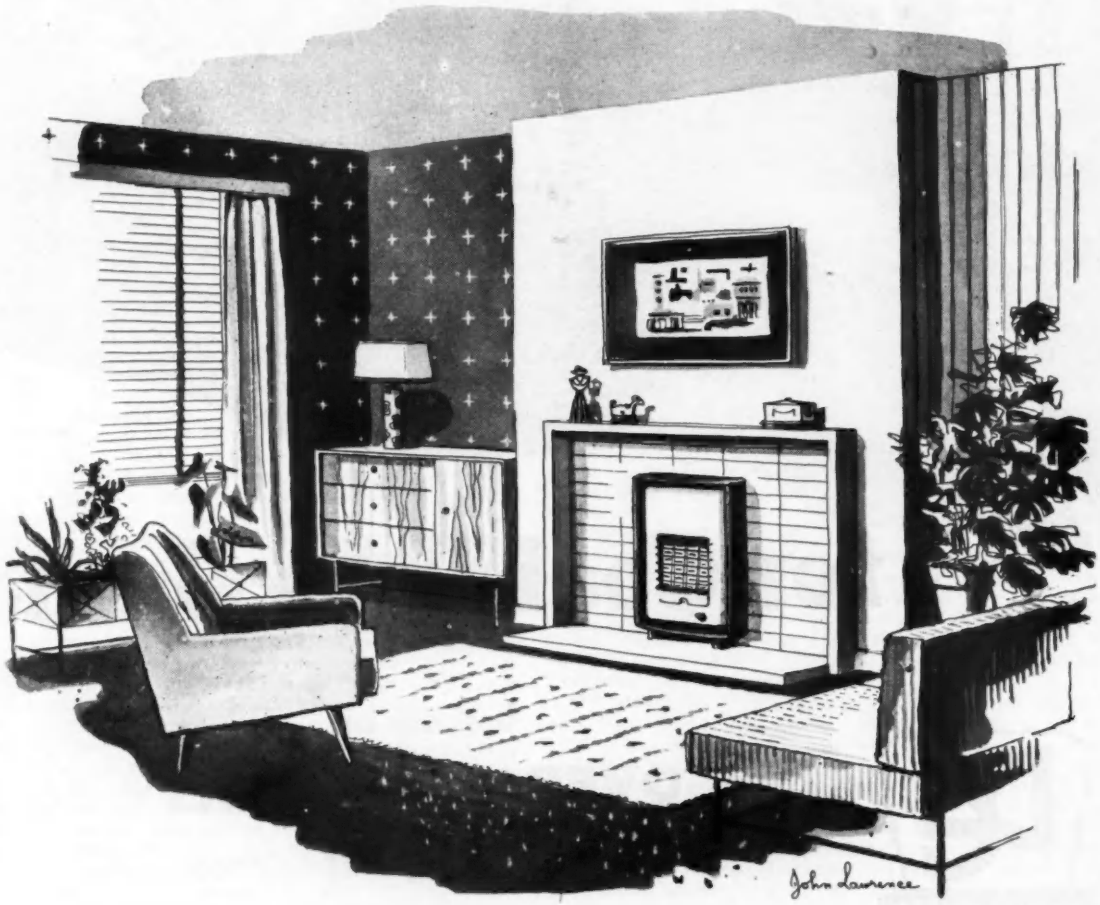

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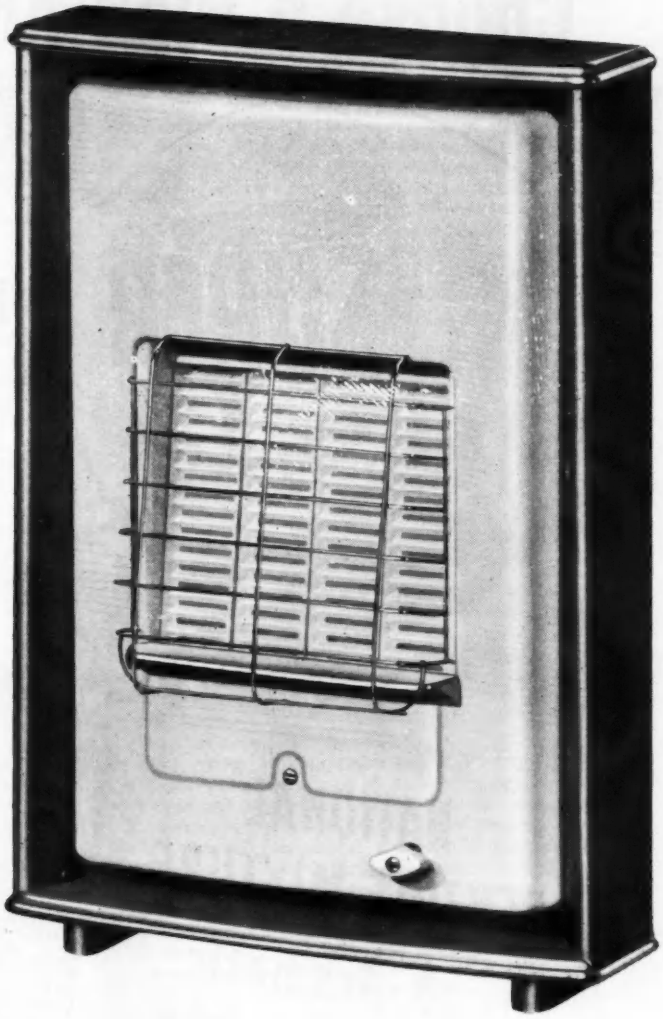

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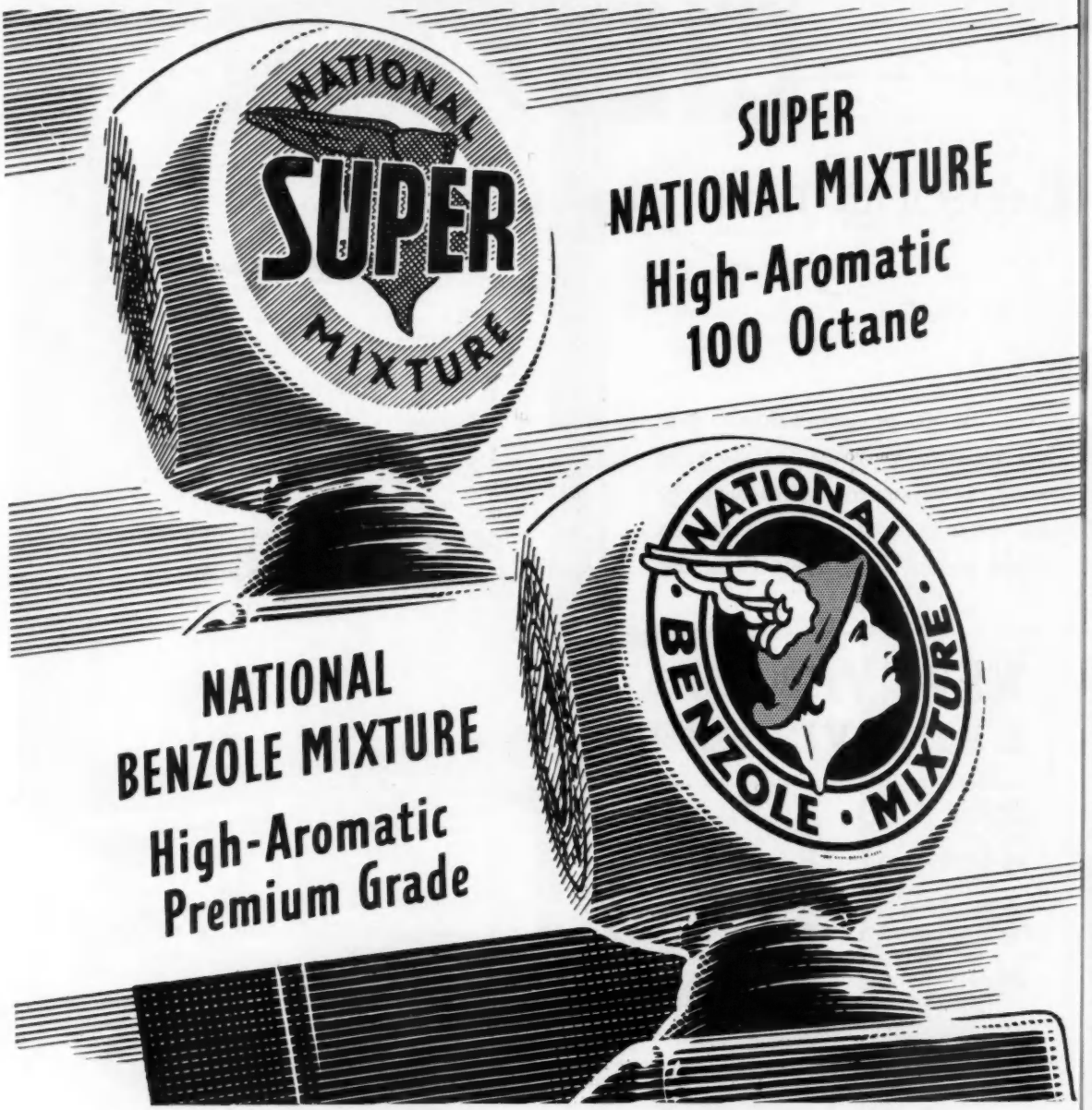

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further research lest this opportunity be exploited more seriously by others, said Mr. Poulson. Smokeless fuel, which had always been the sheet anchor of their gas costs, was the business of the gas industry and should not be left to anyone else.

Dr. Burns stated that there were great possibilities in the sort of things Mr. Poulson had mentioned in connection with new carbonising plants. He added: It may be that there will be an increasing demand for coke without any rapid increase in the demand for gas. I think the signs are in that direction at the present time. The carbonising of low rank coals gives us a slight degree of flexibility in that direction insofar as the production of coke is not accompanied by quite so much gas as in other methods.

Carbonising Under Abnormal Conditions

Mr. G. J. B. Cox, Edinburgh, said he wished to put forward what were his own views on what should be the future of the production of smokeless fuels from low rank coals such as those produced in the Lothians coalfield. During the last year or so a good deal of experimental work had been done south of the border on the carbonising of such low rank coals, and the tendency seemed to have been to carbonise them under abnormal conditions by reducing heats and speeding up throughput, as they did to produce Grancole, in order to increase the volatile therms. He would like to suggest that this was quite unnecessary and that a reactive coke could be, and was being, produced from low rank Scottish coals under normal carbonising conditions. The C.A.B. of the Ministry of Fuel and Power Standard Test Coke from high rank coals appeared to vary from .058 to .063; that for coke from Scottish low rank coals in continuous vertical retorts from .04 to .05, and for Grancole, from .035 to .045. These figures indicated that while coke from Scottish low rank coals was appreciably more reactive than coke from high rank coals, the further increase in reactivity shown by Grancole was comparatively small and was probably offset by the loss of efficiency due to the reduction of radiation by the flame. What then was the advantage of Grancole and kindred fuels for use in all but the most primitive of grates? He suggested that Grancole was superior to normal Scottish cokes in one way only and that was that it was low in ash, being produced from coals whose ash content was generally not more than 5%. He was of the opinion that there was a market for a higher-grade fuel than the coke they normally produced; rather than continue to experiment with low heats and high throughputs, they should carbonise all coals under normal conditions and where there was the demand and where plant permitted, those Lothian coals whose ash content was not greater than 5% should be carbonised separately, the coke screened and stored separately, and sold as a high-grade low ash smokeless fuel at an enhanced price. This could only be carried out at those works where there was more than one retort bench and more than one screening plant, but that applied for any special fuel, and at Granton something of the sort could be done provided that the stocks of each quality and grade of coke did not become too high.

On the present allocations, Granton should be ('I don't say is') supplied with a tonnage of Lothian coal containing not more than 5% of ash, which represents approximately 20% of the total allocation from all sources, and, by segregation, it should be possible to obtain from this coal up to 500 tons of high-grade low ash coke per week which should satisfy the potential market for some time to come.

For 17 years he had burned coke from high rank English coals in an open grate. For three years they used Scottish coke from Scottish low rank coals and for reactivity, appearance and general efficiency, Scottish cokes had it every time. 'Those of you who have not been in the South of England and experienced the type of coke generally available there should try it and you would return realising that increased reactivity is not the problem in Scotland but that your efforts should be concentrated on producing a clean, well-sized fuel with as low an ash content as the National Coal Board will allow.'

Mr. H. S. Hughes said the domestic coke market in the Scottish Gas Board's area had up till now been relatively small and unimportant except in certain places such as Edinburgh, Dumbarton, Perth, Hawick and perhaps a few other localities. This position was changing and the rate of change would accelerate now that the Clean Air Act was law. The three small smokeless estates already in operation were the forerunners of more and larger areas in the near future, the first of which would be a portion of the City of Edinburgh at Sighthill, commencing on March 1 next year, with East Kilbride near Glasgow following soon after.

They should have no qualms about their ability to provide a satisfactory coke for this growing demand. Most of their larger carbonising plants were continuous verticals and they knew from experience that the coke made in C.V.R.'s from Scottish coals was normally free-burning and gave a good performance in an open fire. If the ash content did not exceed about 10% and shale was low, inherent coke quality would be satisfactory. In the larger works, where facilities were available, it would be advantageous to segregate the better coals for the purposes of manufacturing a really good domestic coke.

Domestic appliances had small fuel pot capacities and the sizing of the fuel used had a marked effect on performance. During the past three or four years the Board has been able to give rather more priority for capital expenditure on coke preparation plant, and since nationalisation 10 works had had new plant installed or existing plant modified to bring it up-to-date. Two or three small works had acquired portable plant and one of their major works now had a complete new coke plant in course of construction. This modernisation had enabled a large proportion of their coke to be sized to the I.G.E. recommended size ranges and greater standardisation of sizes throughout the Board's area was now possible.

Gas Council Coke Sizing Survey

A coke sizing survey for the Gas Council carried out in six Scottish gasworks in 1951 showed that the sizing of their coke compared favourably with that of other area boards, and a recent survey of 34 of their works had further indicated that, with quite minor modifications to screen mesh sizes in some cases, the bulk of the coke from these works could be made to conform with the recommended size grades.

When the necessary changes have been made, local names for coke sizings will disappear and the I.G.E. size numbers will be substituted. Because of the free-burning nature of their coke—and this applied to most of their horizontal as well as C.V. coke—some increase in the upper limit of size for the No. 2 coke was permissible and was in fact an advantage. Good sizing implied minimum of undersize; and proper debreezing of coke immediately prior to loading or bagging was essential. The remaining factor, reasonable moisture control, should present no real difficulty in a well-controlled works. If all these points received proper attention, said Mr. Hughes, they could be sure their coke would be perfectly satisfactory for any of the appliances listed in the Gas Council's Coke-burning Appliances Handbook.

Apart from the physical aspects of coke preparation, they should have to make even greater efforts to increase their sales drive and to maintain an efficient after-sales service to consumers, particularly in smokeless areas. It was pleasing to note that such a service was working well and was appreciated, both by local authorities and by householders in the three smokeless zones already in operation.

Dr. Eaton referred to experiments in the south with cokes of the type used in Scotland: We take out only ¾ in. All above is sold for the open fire and we have very much success. It is one way of cutting down your coke preparation costs and at the same time giving you more coke for the open fire market.

Sir Henry Jones, winding up the discussion, said: I think the authors of the Symposium all felt that each Board will have to make its own effort and provide the answer to its own problems. What the authors have tried to do is to study the problem as best they can and set out the problem as they saw it. There is a need for a great effort right through the country if we are going to take advantage of the great opportunity. It seems to me that if the public take the clean air conception seriously, there will be a big demand for solid smokeless fuel. I believe that the gas industry can find a remunerative and fruitful market by supplying a good solid smokeless fuel in the form of gas coke of good quality. I feel that on the marketing side we have got to remember that this changeover from coal to solid smokeless fuel will present many problems to the coal merchant.

Scottish Association of Gas Managers

Coke Preparation

by

GODFREY WOOD,
M.Inst.Gas E., A.M.I.Mech.E.

THE provisions of the Clean Air Bill have set major problems for the gas industry. The supply of adequate quantities of smokeless fuel is probably the biggest problem. This is mainly a question of policy which is related to the economics of various gas and coke manufacturing techniques, but I have been asked to speak on the practical rather than the theoretical problems of coke preparation for sale.

Coke in some areas of this country has been known as 'cinders.' Definitely it has been the Cinderella of our industry. As a by-product it has not been given the same consideration as gas. But it would appear that in the future both coke and gas will become main products. The cost of handling of coke and breeze can be high and as a result there have been many supporters of a case for remaining a one-fuel industry. However, we have now committed ourselves to the supply of two smokeless fuels and we have to ensure that both receive equal consideration in their preparation. If coke can be made into an acceptable fuel it should be possible to assess weekly, monthly, and annual requirements based on previous years' sales.

Over the last few years sales have been controlled by the economic position of overseas markets and the unpredictable policy of the Government in relation to coal imports and coke exports. If coke is accepted by the public, export and import policies will not affect sales. Well-prepared coke, sold at an economic price, has proved to be acceptable when used in appropriately designed appliances.

In the majority of gasworks good coke preparation for sale will entail a fairly large demand in labour and at the moment there is a shortage of labour in most areas. The supply of gas to specification must be continuous; maintenance of gas supply, of the correct quality and purity, will always have first demand on available labour, so that in small and medium sized works labour normally used on coke preparation will frequently be used to the advantage of gas consumers and to the disadvantage of coke consumers. If we are to satisfy the coke market the most obvious answer is to cut down to a minimum the labour required on coke preparation. There is no doubt that the principles of work study must be more seriously applied in the gas industry and they can be applied successfully in the process of coke preparation.

Coke Quality

The London and Counties Coke Association issued some time ago a report on coke quality. In this were laid down the now well-known provisions for the production of a satisfactory coke.

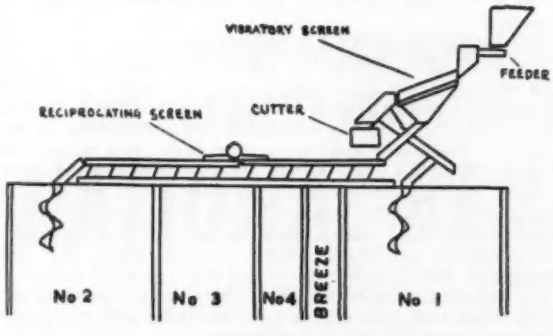

Fig. 1

The significant properties were: (1) Sizing; (2) ash and shale; (3) moisture; and (4) combustibility.

The percentage of ash and shale in coke is dependent on the type of coal carbonised over which we have very little control. The presence of shale can be a source of serious complaints and it is almost certain that steps will have to be taken in the future to reduce the quantity of shale in coke sold for use in domestic open fires. A recent proximate analysis on run of retort coke from a works in my area gave an ash content of 6.3% on a basis of 2% moisture. Our own tests are usually about 10% on a dry basis. Combustibility depends on the coal supplied and the carbonising techniques applied and these are controlled by policy outside the manager's control.

Moisture and Sizing

Coke with a high moisture content is obviously uneconomic to the consumer. Excessive moisture makes the coke more difficult to ignite and it is possible that it also has some bearing on the explosion which takes place when shale is present in the coke. Too much moisture also reduces screening efficiency. On the other hand very dry coke is unsatisfactory because of the dust nuisance in handling. Moisture in coke should be between the limits of 3 and 10%. These limits are quite wide and there should be no difficulty in meeting this specification. However, employees who have probably had the unpleasant experience of dealing with coke bunker fires, will tend to be over-cautious and use excess quenching water. Supervision should be given when possible and the quantity of water controlled mechanically.

Presented to the Autumn Meeting, at Largs, on September 20, 1956.

In Scotland, where high steaming is practised in vertical retorts, there should be very little danger from coke firing if bottom castings, steam and water sprays are well maintained. It may be necessary to moisten the coke by spraying to prevent dust troubles. Preferably this should be carried out with a fine spray and the quantity of water controlled.

The London and Counties Coke Association have also issued a report on coke sizing. Standard sizes were recommended for various applications and these sizes have been accepted by our Board. Although just over 60% of the coke made in Scotland is sized in modern screening plants there does not appear to be any works which has been consistently screening all coke made for sale to the standard sizes. In some instances this will probably be due to local marketing conditions and difficulties in adapting plant to standard screen sizes.

Screening coke to size limits is most important if it is to be used successfully. Appliances are now designed in relation to the standard sizes and will only give optimum efficiency with the correct sized fuel. The London and Counties Coke Association report deals fully with the various types of screens and their suitability for various applications. This report recommends the abolition of static screens and gives details of the most effective types of mechanical screens for scalping, main grading, screening at hopper outlets and de-breezing.

Generally, plants are now designed with a scalping screen of the oscillating, reciprocating or vibrating type followed by main grading on reciprocating screens (Fig. 1). Screen aperture

sizes of ⅜ in., ½ in., 1¼ in. and 2 in. will normally produce coke to specification but this will depend to some extent on hopper construction and breakage in the hoppers. All coke handling plant should be so designed to minimise coke breakage and the excessive formations of breeze. A considerable amount of wear takes place in main grading plants and experiments are taking place in the use of aluminium as a wearing surface to cut down maintenance costs.

At some point prior to the main grading plant it is advantageous to have some form of buffer hopper to accommodate coke made during periods when the plant is out of action. In some instances a night storage hopper is installed as part of the plant and this will normally cover emergencies. An alternative in large works is the installation of duplicate screening plant.

Coke Hoppers

The capacity of coke hoppers for the various sizes should be given careful consideration. The relative quantities of the various grades made will depend to a great extent on the type of coal carbonised. I have tried to obtain some information on this from the figures of various undertakings but due to the fact that few works grade to standard sizes continuously, the figures would be misleading. One works, with a new plant carbonising coal in the proportion of 11%-800 rank; 37%-700 rank; 52%-600 rank, produced, over a short period, 25% of each size of coke. In undertakings carbonising 800 and 900 rank coals, it may not be economic to produce No. 1 size coke. In my own works we have only recently started to prepare coke to standard sizes. All the coal carbonised is 800 rank and the coke is now graded into Nos. 2, 3 and 4 sizes. Approximately 50% of the coke produced for sale is No. 2 size, 47% No. 3, and 3% No. 4. In some areas consideration might be given to the supply of double sized coal only—to small vertical retort plants. This may practically eliminate No. 1 and No. 2 coke sizes. No. 2 size is the domestic open fire type which it will be more important to make in larger towns which introduce smokeless zones. Under present conditions in Scotland we only manufacture 15 cwt. per annum of coke and breeze for sale per gas consumer. The proportion of No. 2 domestic coke may only be 5 cwt. which will not meet the requirements of all domestic open fires.

Where stocking and reclaiming coke can be carried out easily by mechanical means, hopper capacities may be kept to a minimum but it may be advisable, to minimise breakage, to have sufficient capacity to cover a holiday week-end and the possibility of a five-day week.

De-breezing

De-breezing of coke at the hopper outlets is essential in order to supply a standard fuel. With coke from Scottish coals, de-breezing screens may not be sufficient to provide coke within the range of the grade and it may be necessary to install guard screens, which will screen out the sizes below the minimum grade size, in order to conform to specification. This particularly applies to the larger coke sizes including No. 2 domestic coke.

With mechanical de-breezing we have found that in our plant approximately 2% of breeze is collected from coke containing 10% moisture. Regular removal of breeze from the collecting hopper is essential to maintain efficiency. An electrical arrangement whereby the coke feed is cut out when the breeze builds up to the screen might be considered. In some plants, arrangements are made for the breeze to be loaded direct into wagons, lorries, or belt conveyors (Figs. 2 and 3). In small plants the breeze usually has to be barrowed away. (Fig. 4.) It is important to see that this can be done with the minimum of labour. Should it be necessary, in the future, to use guard screens the reject material will require to be rescreened to recover the coke in it. This should be kept in mind when installing new plants.

Loading and Stocking

Loading loose coke from hoppers is straightforward: A guard or de-breezing screen set, to operate before opening the coke outlet, will cope with this provided a suitable mechanical screen is fitted at the correct angle and the flow of coke is suitably controlled (Fig. 4). Overloading of the screen is possible and will reduce the efficiency, but this can be guarded against by restricting the travel of the hopper outlet door, or seeing that coke will not pass over the screen unless it is in operation.

Bag filling, being intermittent, is more complicated and can be wasteful in the use of labour. With some arrangements screening is continuous while the bag filling is intermittent. This has the disadvantage that the operator has to control the feed on to the screen relative to the rate of bag filling. To overcome this, there is an arrangement whereby the feed is interlinked with the control of coke entering the weighing hopper (Fig. 2). The movement of coke over the screen with this method is related to the rate of bag filling. Another alternative method incorporates a vibrating feeder from the bunker outlet

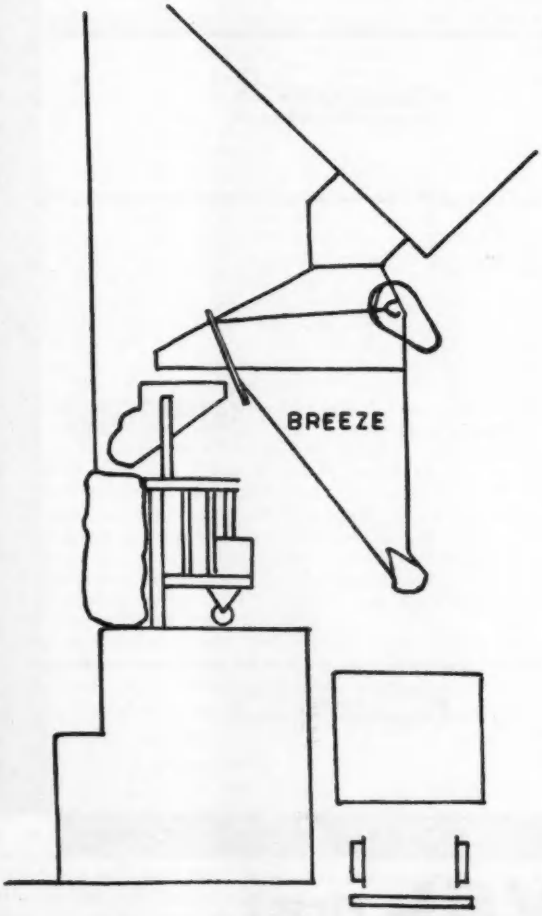

Fig. 2

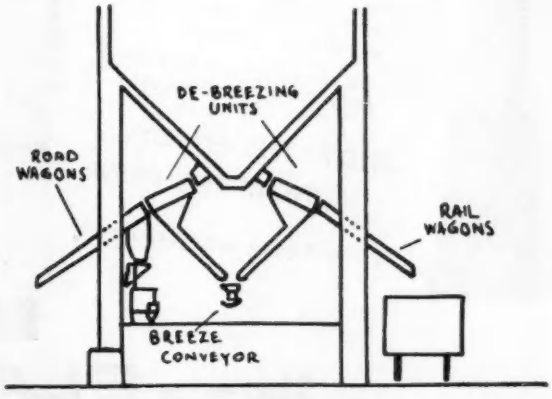

Fig. 3

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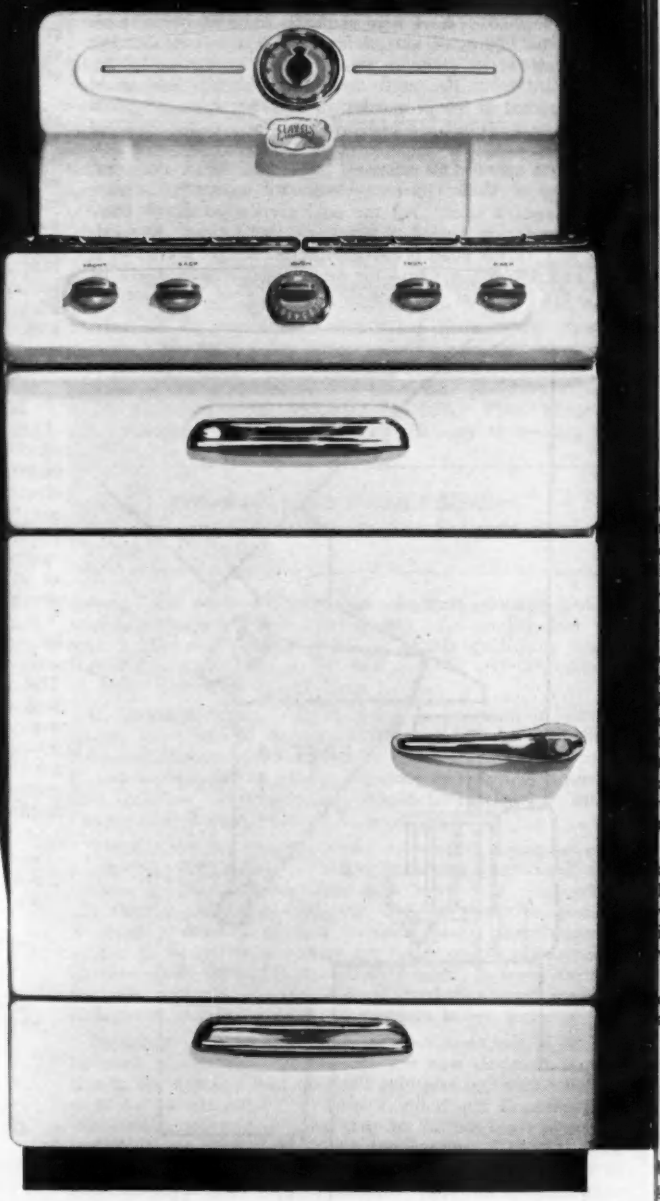

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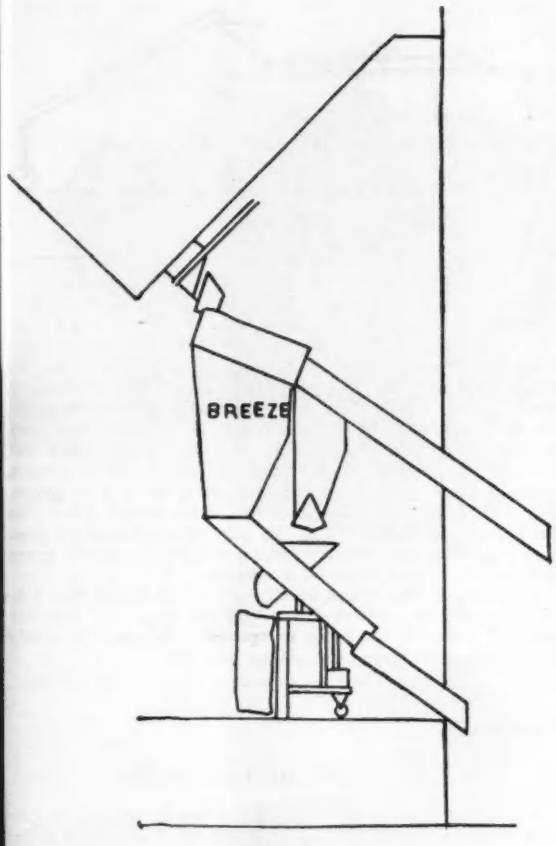

Fig. 4

on to a mechanical de-breezer (Fig. 5). The de-breezer deposits the clean coke into a transfer hopper; the vibrating feeder is controlled electrically by a bin level control. Electrodes set in the coke transfer hopper start and stop the feeder as required. Coke is discharged from the transfer hopper into the weighing machine and then into bags.

With one arrangement the coke from the hopper feeds direct on to a vibrating screen and the coke will not pass over the screen unless it is in operation. The operator filling the bags has a switch close to hand which controls the de-breezing screen. The bagging machine should be so placed that the filled bags can be loaded on to lorries with the minimum labour (Figs. 2 and 3). Weighing machines may be hand or electrically controlled and should be regularly checked. The excessive wear from coke will lighten the coke hopper and result in the sale of overweight in each bag.

Seasonal stocking of coke will vary according to the district and the types of demand. Domestic demand has the poorest load factor and an undertaking having a large domestic load will require to stock about 20% of the annual sales. If C.W.G. is made to implement winter gas supplies a larger proportion will require to be stocked.

Local circumstances will probably determine whether run of retort or screened coke is stock piled. This will depend on a number of factors, including:

(1) What mechanical equipment is available for handling.
(2) The space available.
(3) Markets for various sizes.
(4) Breeze required for own use.

Screened coke from the plant can usually be easily stocked by tipping lorries and portable elevators. Stocking various grades separately may take up more space although temporary walling can overcome this. A good continuous market for a particular size will demand the continuous screening of run-of-retort coke as will our own demand for breeze for solid fuel boilers. With good markets for smaller coke it may only be necessary to stock the large sizes. It has been suggested that merchants should be given encouragement to stock coke during the summer. This would only be satisfactory if the merchants have re-screening facilities which would be used when the coke is resold at winter prices. Sales direct to the public at lower summer rates might be considered economic.

Recovery

Recovery from stock can be either to the coke plant or direct to the consumer. The most economical way will probably depend on the facilities available. If the coke plant has sufficient loading bays to meet the maximum demand it would appear to be most economical to recover through the plant if the necessary elevating plant is also available. In this way coke can be recovered when most convenient to the labour, transport or mechanical equipment available. De-breezing will take place twice, once at the main screens and secondly at the hopper outlets. An example has been quoted of horizontal coke from high quality Durham coal containing 25% at the core of a heap with an average breeze content of 18%. With friable Scottish coke this figure could possibly be greater. Efficient screening of this may not take place over a single screen.

Recovery direct to the consumer entails sufficient men and plant being available to meet maximum demands at any time. With large quantities of breeze, screening may not be to specification and the disposal of the breeze will require additional labour or mechanical plant. If guard screens are introduced

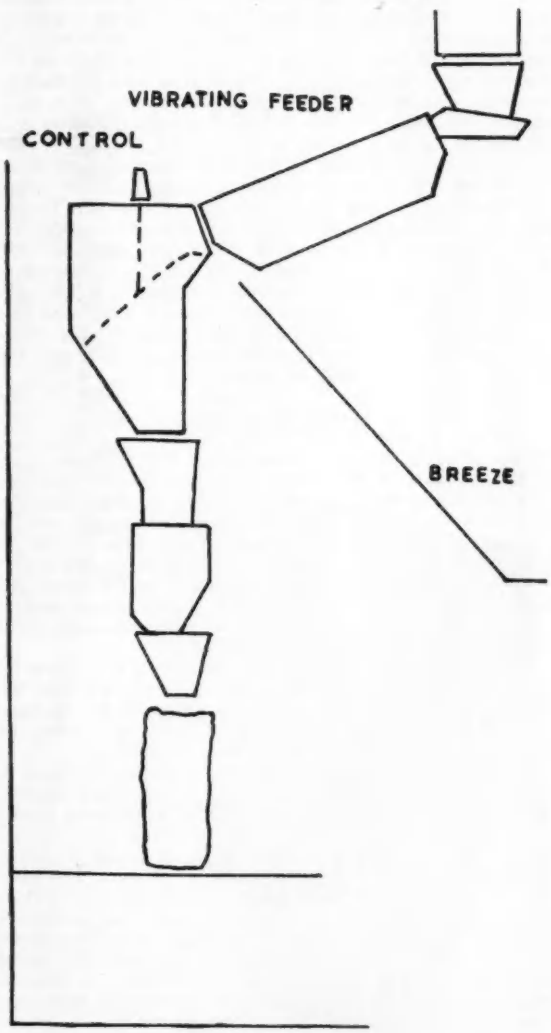

Fig. 5

the rejected material will require to be re-screened to recover the smaller coke sizes or a double deck screen used.

Small Works

The smaller works present a problem. To obtain efficient mechanical sizing the run of retort coke must be raised to a height beyond the reach of manual labour and this requires mechanical plant. The installation of bunkers and de-breezing plant is expensive in relation to the quantity of coke handled. The number of sizes of coke made could be kept to a minimum by eliminating No. 4 size. In vertical retort plants carbonising 800-900 rank coals, only Nos. 2 and 3 cokes would be produced. The screen sizes could be ¾ in., ¾ in., and 1¼ in. In horizontal works fair quantities of No. 1 size will be produced. The simplest arrangement would appear to be the elevation of the coke by portable conveyor on to a main grading screen set over brick or concrete division walls (Fig. 6). This arrangement does not require any expenditure on expensive foundations. The portable conveyor could probably be used for other purposes when sufficient coke has been screened to meet immediate demands. No provision is made for de-breezing at time of sale. Where small works are likely to be closed down or are relatively near to larger works centralised sizing may be the most economic alternative.

Sales

A difficulty does arise where a consumer wishes to burn coke and intends to use it for an open fire and a water heater. Storage is required for two sizes of coke and this is not always readily arranged in some houses. A suggestion has been made that we should consider making regular deliveries of coke in non-returnable paper bags of ½ cwt, or, if suitable premises are available, that 28 lb. paper bags of coke be sold from showrooms. We might consider offering for sale a suitable coke storage bin having a capacity of 2 or 3 cwt.

To sum up: We have to be prepared to produce a smokeless fuel which will be of a continuous standard quality with a relatively constant moisture content and size grading. To produce this fuel economically it will be necessary to see that any plant installed will do its work successfully with minimum breakage, the minimum of labour, and give the highest output possible from the labour employed. When the supply of a particular size of coke exceeds the demand it has always been possible to find ways and means of disposing of the excess. Some methods used result in the discrediting of coke as a fuel and, of course, this tends to reduce sales.

DISCUSSION

During the discussion on the paper **Mr. Paterson,** Dumbarton, commented that normally the fuel used in producers was given as so many pounds of fuel per hundred pounds of coal carbonised. 'We have heard a lot today about making cheap gas,' he added. 'We should always keep that in the forefront of our minds. It is our first essential. In this respect I say that all statistics should be related to the therm and not to the ton of coal or the hundred pounds of coal carbonised. These figures can be misleading. The statistics should always be brought back to the therm of gas.'

Mr. R. S. Hughes thought that they might be able to go rather higher in moisture content and still produce a coke that would be acceptable to the coke consumer. In his six years in Edinburgh he had never had any complaint from a consumer of an unsatisfactory coke due to high moisture.

Dr. Eaton said that on the question of sizing in relation to the burning properties of coke, he had already mentioned that the fire test was the method by which one could most readily assess the quality of coke. That fire test did one or two things. It was dependent upon moisture to some extent, upon the intrinsic combustibility of the coke, and also upon the sizing. That gave the producer a very great deal of flexibility because he could produce a coke which was satisfactory either by altering his sizing, his moisture, or the intrinsic combustibility of the coke. That was why, he felt, that in the B.S.S. they have a fire test only. That would give them, at least in the early stages, some latitude in which to work, and that was why they rather stressed the fire test.

Dr. Eaton referred to experiments in which material below ¼ in. was taken out: 'The coal was washed sized coal. It was of low grade and therefore when it went through the carbonising plant it came out almost exactly the size it went in. The actual size of that material had very little above 2 in. Ninety-five per cent. was within the range of ¼ in. to 1¼ in. In trying that coke on an open fire it gave very satisfactory results. The Coke Sizing Panel felt that the near-size material was the important thing. Mr. Wood has given certain sizes for the apertures on the screens themselves. I think that that is rather simplifying the problem. If you want to remove material below ¼ in. you will have to use ¾ in. or 1 in. screen. The size of the product all depends on the rate at which you put the coke over the screen. By altering your aperture sizes on your screens you can overcome disadvantages of the screen itself which may perhaps be overloaded.

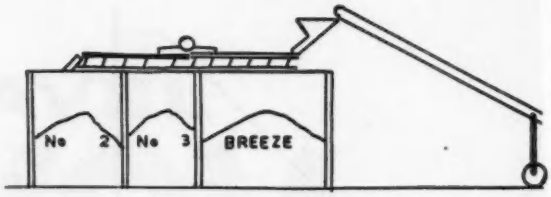

Fig. 6

In his reply, **Mr. Wood** stated that he had found that coke of 10% moisture content was a very dry coke and dust still came off it when it was being de-breezed. Perhaps 12% would be a better percentage for handling purposes.

Translation

Corrosion in Gasworks

The author claims that at least 20-25% of the capital cost of a gasworks installation must be added as a provision for repair and maintenance of corrosion damage during the working life of the plant. He is full of praise for the British campaign against rust—and, in fact, 'Gremlins in the Gasworks' is a good alternative title for his theme. He lists eight such 'gremlin-affected' locations: Service pipes—the influence of clay oils, in which bacterial action appears to be responsible; house pipes—particularly those passing through ferroconcrete partitions; lead piping—in the presence of alkaline solutions such as fresh mortars and whitewash; brass fittings, especially with over 31% copper, in the presence of kitchen fumes and the like; the household gas meter itself, particularly because of its usually inaccessible position, the effect of dust and fumes, etc. In the gasworks itself, the most obvious weak point is at the purifiers (sulphur!), but attention should also be paid to the effect of rust scales passing from bunkers to the retorts on silica linings, and this is worthy of consideration. The gasholder itself, however, is obviously the most affected point of the plant. Some experiences are described, with three different gasholders: A large, dry gasholder of the M.A.N. type; and two water sealed gasholders. No sovereign remedy is suggested, but an account is merely given, of the damage caused by corrosion, and the trouble and work involved in making good the damage done. In the first case, of the dry gasholder, most of the rust was found at the riveted joints—to the extent of the bursting of rivet heads and leaking seams. Particularly heavy corrosion damage was found at the foot of the holder where mud splashing in heavy rains was found to be an important contributory cause, but was counteracted by gravelling the ground in the immediate vicinity. In the other two cases, water sealed gasholders, which were anything up to 40 years old, showed heavy rusting at the seal (in the cup). This is explained by the action of the sludge accumulated in the cup, which destroys the protective effect of atmospheric oxidation above the sludge line. In actual fact the damage was found to be confined to two narrow strips, extending right round the circumference of the bell at the foot; and had to be made good by replacing all or most of the plates in the two bottom strakes.

N. V. Steenstrup, *Gasteknikeren,* Vol. 45, No. 10, May, 1956, pp. 162-165.

North Eastern Gas Board

South Eastern Gas Board

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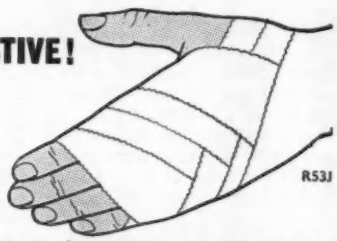

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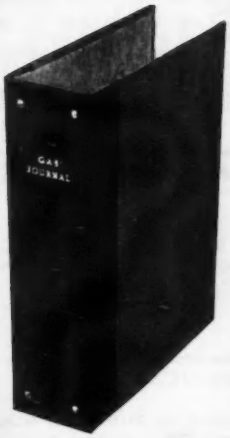

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SCOTTISH GAS BOARD

GRANGEMOUTH DISTRICT
ASSISTANT ENGINEER AND MANAGER

APPLICATIONS are invited for the above post. Candidates must have a sound knowledge of the working of continuous vertical retorts and the usual types of works ancillary plant, and should preferably have had some experience on distribution.

The salary for the appointment will be within the range of Provincial 'A' A.P.T. 5-7 (£575-£750 per annum) with placing in accordance with qualifications and experience. A house is available at a reasonable rent.

The position is pensionable, and the successful applicant will be required to pass a medical examination.

Applications, stating age, and giving full particulars of education, training, experience and qualifications, should be addressed to the District Manager, to arrive not later than Saturday, October 13, 1956.

Gas Works Office,
Dalgrain Road,
Grangemouth.

SCOTTISH GAS BOARD

LANARKSHIRE DIVISION

APPLICATIONS are invited for the post of OFFICE MANAGER in the Finance Section of the Divisional Headquarters of the Board, Uddingston. The commencing salary will be within Grade A.P.T. 10 (£820/£920 per annum). Applicants should have a recognised accountancy qualification and have wide experience in controlling a large office and in machine accountancy. A knowledge of recent developments in organisation and methods procedures would be an added recommendation. The position is pensionable and the successful applicant will require to pass a medical examination. Applications stating age and giving particulars of education, training, experience and qualifications, together with the names of two referees, should be sent to the Divisional Financial Officer at the undernoted address in a sealed envelope endorsed "OFFICE MANAGER," to arrive not later than seven days from the appearance of this advertisement.

JAMES M. DOW,
Divisional Controller.

Divisional Offices,
Bothwell Road,
Uddingston,
Scotland.

September 19, 1956.

SCOTTISH GAS BOARD

KILMARNOCK GROUP
ANNAN DISTRICT
APPOINTMENT OF DISTRICT MANAGER

APPLICATIONS are invited from suitably qualified persons for the post of DISTRICT MANAGER of the Annan District Gas Undertaking.

Applicants must be experienced in the administration and supervision of a gas undertaking and possess a sound practical knowledge of horizontal retorts, distribution practice and general office routine.

The salary applicable to the post will be within A.P.T. Grade 7, Provincial 'B' of the Salary Scales of the N.J.I.C. for Gas Staffs, with placing according to qualifications and experience. In addition, a free house and fuel allowance will be provided.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications stating age, and giving particulars of education, training, experience and qualifications, should be addressed to the undersigned to arrive not later than 14 days from the appearance of this advertisement. The names of two referees should also be given.

ROBERT FIFE,
Group Manager.

Riverbank Gas Works,
Kilmarnock.

September, 1956.

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NORTHERN GAS BOARD

(TYNESIDE DIVISION)
SENIOR HOME SERVICE ADVISER

APPLICATIONS are invited for the position of SENIOR HOME SERVICE ADVISER.

Applicants should hold a recognised Domestic Science qualification and be capable of organising and developing the work of the Home Service Department and the indirect promotion of gas sales and service.

Salary will be within Grade A.P.T. 8 of the National Scales and commencing at a suitable step in Stage 1 of the transitional scales (£640/£714) rising to £790 per annum.

The successful applicant will be required to pass a medical examination and subscribe to the Board's Pension Scheme.

Applications, stating age, qualifications and experience and giving the names of two referees should be addressed to the undersigned within two weeks of the appearance of this advertisement.

W. SUTCLIFFE,
Divisional General Manager.

30, Grainger Street,
Newcastle-upon-Tyne, 1.

WEST MIDLANDS GAS BOARD

BIRMINGHAM & DISTRICT DIVISION
ASSISTANT INSTRUMENT ENGINEER

APPLICATIONS are invited for the post of ASSIS-TANT INSTRUMENT ENGINEER on the staff of the Divisional Chief Chemist.

Candidates should be appropriately qualified and must have experience of temperature, pressure and flow instruments. Ability to assist in lay-out and installation of instrumentation and of control of labour is essential.

The salary will be within A.P.T. Grade 8 (£710 to £790 per annum) of the National Salary Scales.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications stating age, experience, positions held and qualifications, together with the names of two referees, should be addressed to Mr. J. E. Wakeford, Divisional General Manager, West Midlands Gas Board, Gas Offices, Edmund Street, Birmingham 3, to reach him not later than October 8, 1956.

J. C. INGRAM,
Secretary to the Board.

NORTH EASTERN GAS BOARD

HEAD OFFICE
EDUCATION OFFICER

APPLICATIONS are invited for the post of EDUCATION OFFICER in the Industrial Relations Department at the Board's Head Office in Leeds.

The salary will be within Grade A.P.T. 12 (£900-£1,025 per annum) of the National Salary Scales.

The duties will include the initiation and administration of training programmes for all classes of employees and liaison with Technical Colleges in the provision of courses suitable for Board employees.

It is desirable, but not essential, that applicants should possess a degree or equivalent qualification. Experience in industry, preferably in the field of industrial training would be an advantage.

The successful applicant will be required to pass a medical examination and to join the Board's Staff Pension Scheme.

Applications, giving details of age, education, qualifications and experience, should reach the Industrial Relations Officer, North Eastern Gas Board, Head Office, Bridge Street, Leeds, 2, by October 8, 1956.

J. C. GARDNER,
Secretary.

SOUTHERN GAS BOARD

ASSISTANT MEDICAL OFFICER

APPLICATIONS are invited for the new and pensionable post of whole-time ASSISTANT MEDICAL OFFICER. Previous experience in Industrial Medicine would be an advantage.

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The successful candidate will be required to pass a medical examination and, unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required to join the Board's Staff Pension Scheme.

All applications must be made on a form which may be obtained from the Personnel Manager, Southern Gas Board, 164, Above Bar, Southampton, and completed forms should be returned by Monday, October 22, 1956.

P. VALON BENNETT,
Personnel Manager.

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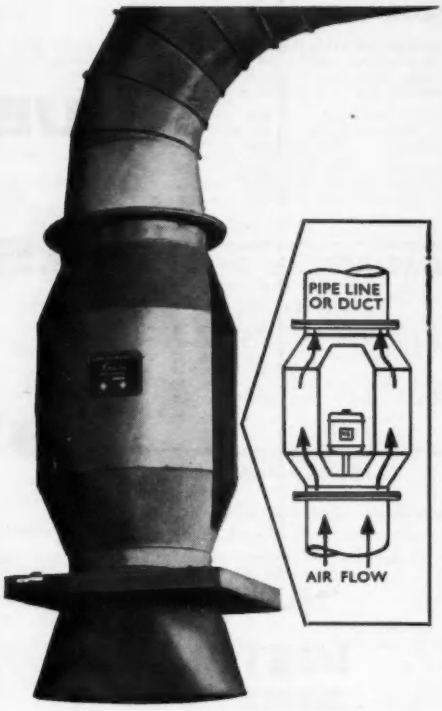

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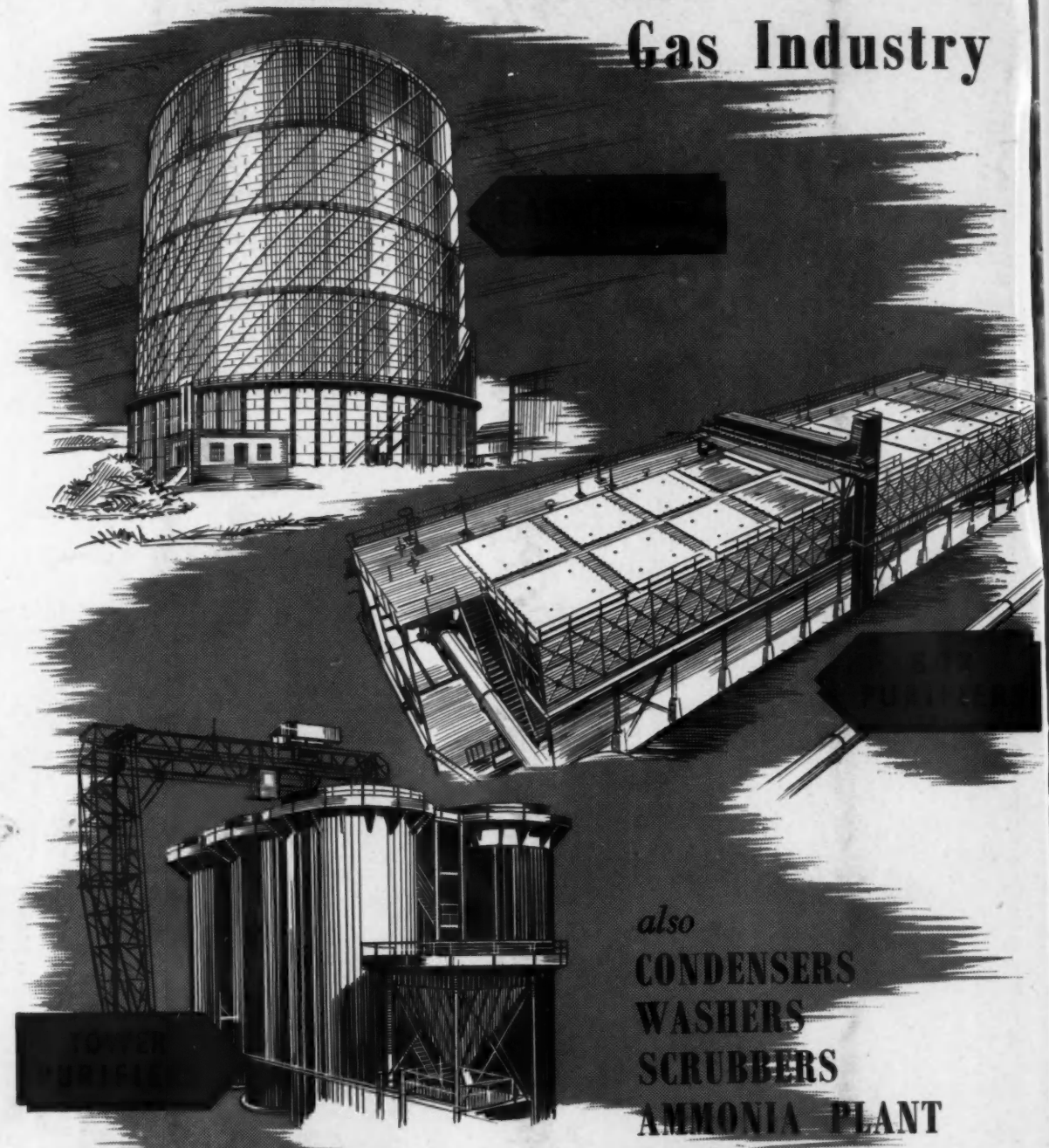

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